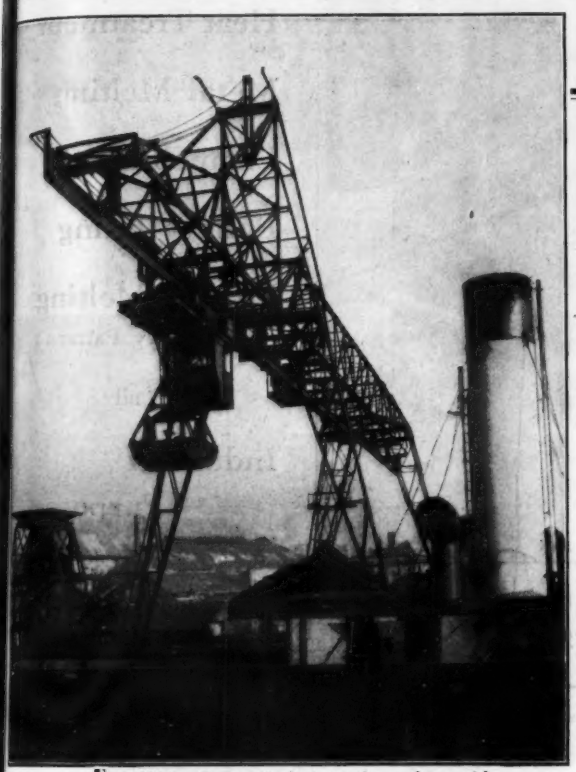
Gas Journal

LIGHT · HEAT · POWER · BYE-PRODUCTS

[Founded in 1849 as the "Journal of Gas Lighting."]

Vol. 210. 87th Year. LONDON, MAY 29, 1935. No. 3758. Price 1s.



TELPHER PLANTS AND TRANSPORTERS

ONE OF THE MOST EFFICIENT AND ECONOMICAL METHODS AVAILABLE FOR THE HANDLING OF COAL, COKE, OXIDE, ETC., IN GASWORKS.

o o o

The illustration shows a top-rail Telpher Machine and Grab, 4½ tons gross load, running on a Travelling Bridge with a lifting jib. This Plant unloads coal from ship or barge at 100 tons per hour, discharging to store, wagons, etc., and also reclaims from store to wagons, etc.

o o o

Write for particulars to the makers with over 30 years' experience in Telpherage :—

STRACHAN & HENSHAW LTD.

Telegrams : Strashaw, Bristol | WHITEHALL, BRISTOL | Telephone : Bristol 57066

A Sound Engineering Production

Strong, rigid body work, which endures year-in and year-out, is an important feature of all George Glover's Meters. Exceptionally heavy tinplate, accurately stamped and formed by press tools of the most modern type, gives to these Meters a firm, durable "chassis" which is in keeping with the skilfully designed and manufactured interior working parts. Standardisation of components is definitely ensured.

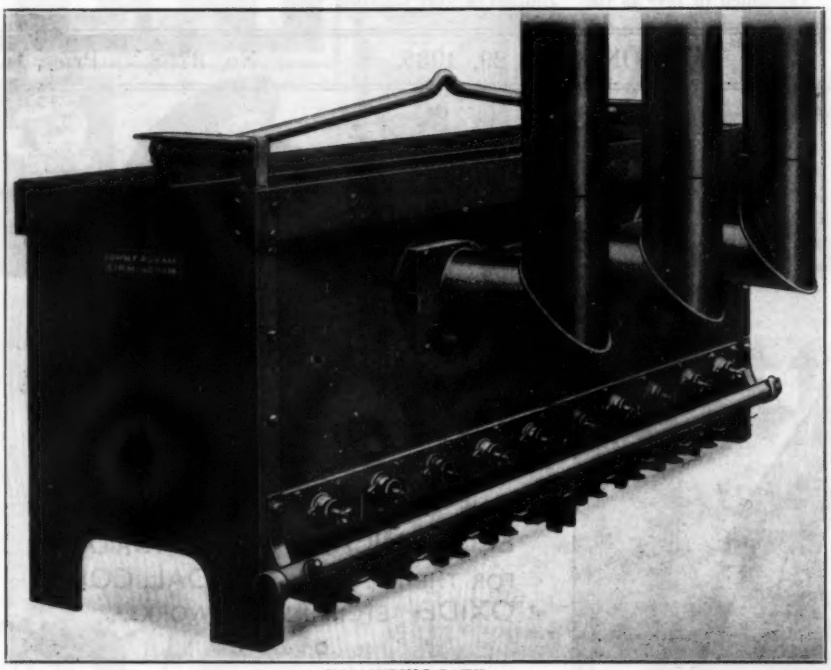
Small High Capacity, High Capacity and Standard Sizes

GEORGE GLOVER

AND COMPANY LTD.
RANELAGH WORKS
ROYAL AVENUE
CHELSEA
LONDON, S.W.3
ALSO LEEDS and MANCHESTER

'Phone: Kensington 7484 (2 lines).
Wires: "Dry Meters, Phone, London."

"ASKAM" FURNACES



TEMPERING BATH

FOR

Heat Treatment

Metal Melting

Enamelling

Pottery Firing

Enamel Melting
(Rotary Pattern)

and all

Industrial
Purposes

JOHN F. ASKAM, AVENUE WORKS, AVENUE ROAD ASTON : BIRMINGHAM, 6

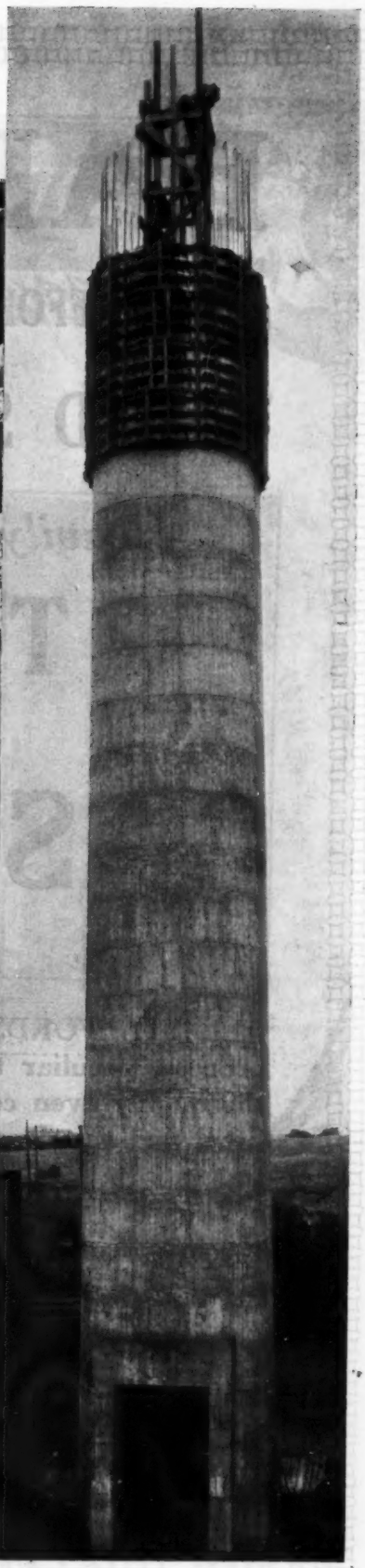
Telegrams: ASKFURCE, Birmingham Telephone: Aston Cross 1179

SILICA RETORTS.

MINIMUM EXPANSION
The
Oughtibridge
Silica Firebrick Co., Ltd.
Oughtibridge,
Near Sheffield.
Estd 1858.

WE
UNDERTAKE
TO MANUFACTURE
SILICA BLOCKS
TO ANY
SPECIFICATION
REQUIRED.

COKE OVEN BLOCKS.



DESIGNS AND REINFORCEMENTS

The BRITISH REINFORCED CONCRETE ENGINEERING Co. Ltd.

HEAD OFFICE & WORKS
STAFFORD

Branch Offices: LONDON: KINGS BUILDINGS, SMITH SQUARE, WESTMINSTER, S.W.1
BRISTOL, LEEDS, LEICESTER, MANCHESTER, NEWCASTLE, CARDIFF, GLASGOW, DUBLIN, BELFAST

BALDWINS'

STAFFORDSHIRE BEST CHARCOAL

TINNED SHEETS & TINPLATES

Heavily Coated with Pure Tin

THE material for GAS METERS.

ALL STAFFORDSHIRE PLATES are Tinned by a special process, peculiar to BALDWINS, Ltd., which ensures a solid thoroughly even coating, and a real amalgamation between the Steel and the Tin.

Makers of the famous

COOKLEY K

HIGH CLASS HEAVILY COATED TINNED SHEETS.

Known throughout the World as the finest Tinned Sheet produced.

All our material is of BRITISH MANUFACTURE THROUGHOUT

BALDWINS LTD.

(Midland Branch), Wilden Ironworks, nr. Stourport, Worcs., England.

Telephone: Stourport 10.

London Offices: 67-71, QUEEN VICTORIA STREET, E.C. 4.

IN CONSTANT SERVICE

Buckingham Palace & THE Houses of Parliament

PERMANENT LIGHTING

by SUGG'S

LOW PRESSURE

GAS LIGHTING

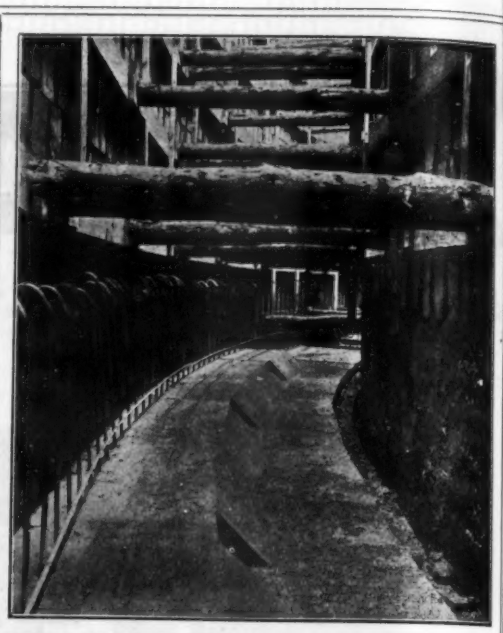
William Sugg & Co., Ltd., are proud in the knowledge that in this year 1935, which witnesses the Jubilee Celebrations of H.M. King George V., their burners are still to be found in these honoured positions.

SUGG
WESTMINSTER

WILLIAM SUGG & Co. Ltd.

RANELAGH WORKS, CHAPTER STREET, WESTMINSTER, S.W.1.

Buildings of every type for the Gas Industry.



Horizontal Retorts
Gasholder Tanks
Railway Sidings
Pile Driving
Foundation Work
Breaker Pits
Hoppers
Bunkers
Retort Houses
Coal Stores
Gantries
Water Towers
Purifier Houses
Chimneys
Retaining Walls
Reservoirs

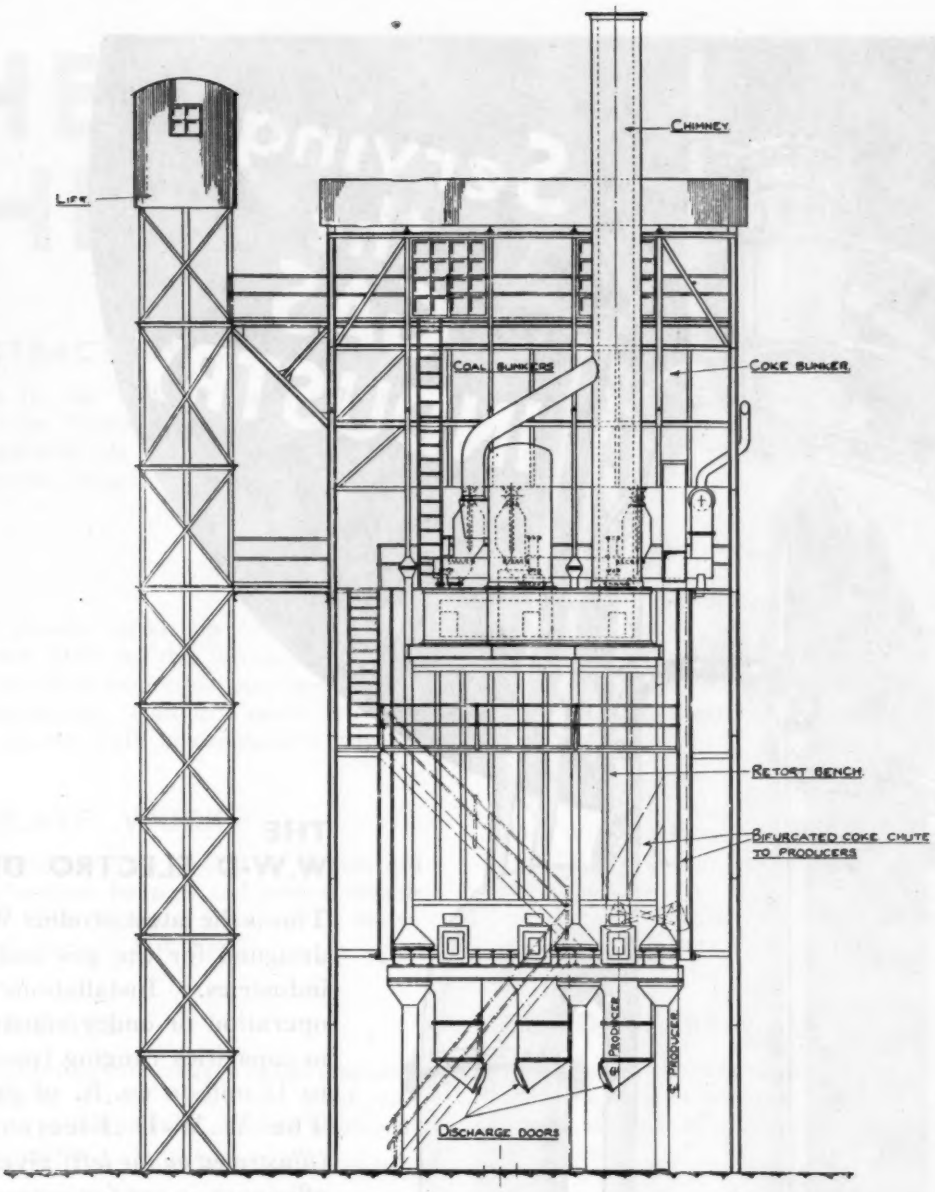
We specialise in construction and welcome your inquiries at any time for any of the plant mentioned.

THOS VALE & SONS, LTD.

ESTD. 1869.

STOURPORT, WORCS.

REINFORCED CONCRETE STRUCTURES



TYPE DRAWING OF CONTINUOUS VERTICAL RETORT PLANT SUITABLE FOR WORKS MAKING 30-40,000,000 C.FT. PER ANNUM

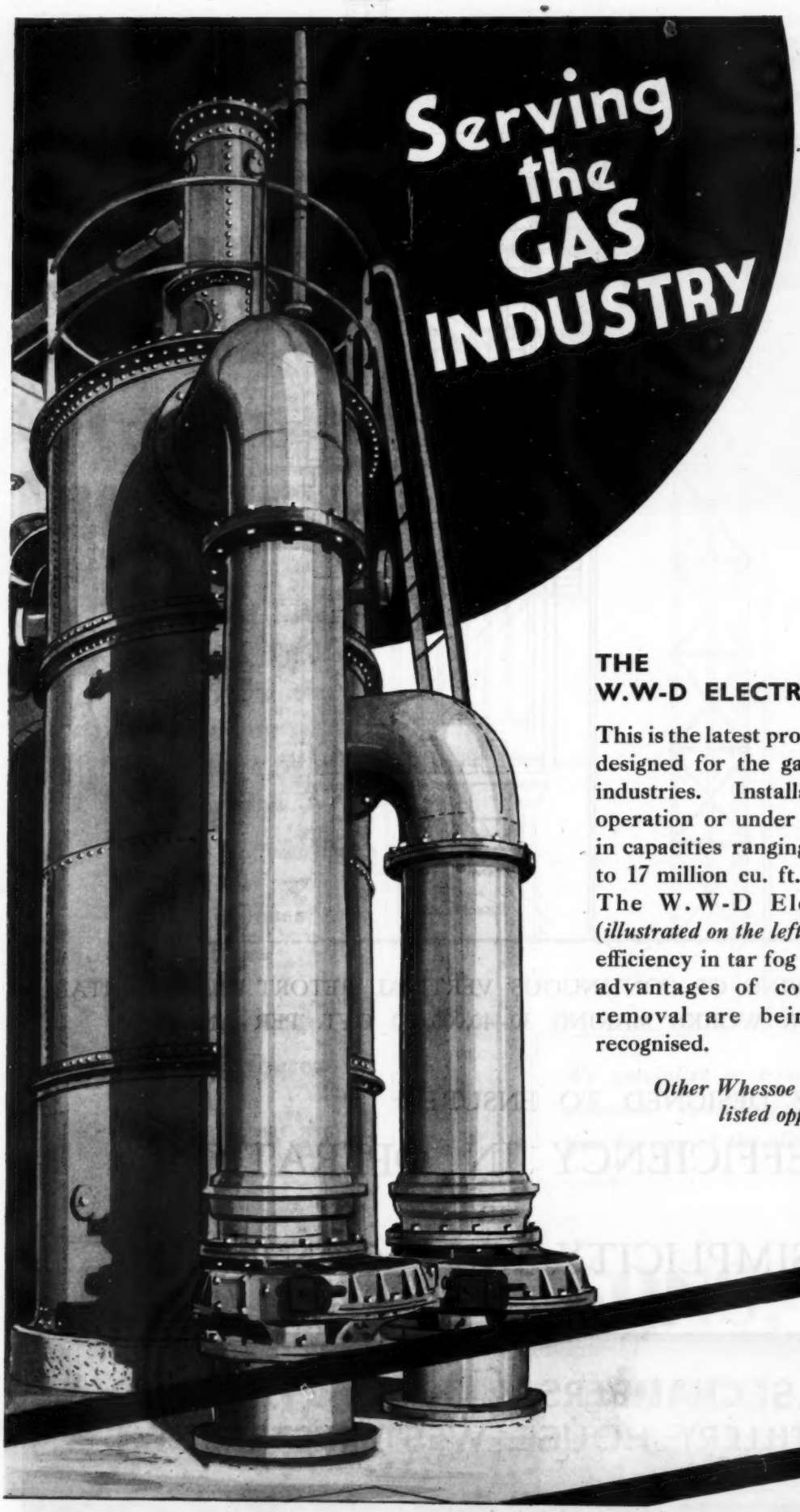
SPECIALLY DESIGNED TO ENSURE

EFFICIENCY IN OPERATION

and

SIMPLICITY IN CONTROL

GAS CHAMBERS & COKE OVENS LTD.
ARTILLERY HOUSE, WESTMINSTER, S.W.1.



THE W.W-D ELECTRO DETARRER

This is the latest product Whessoe has designed for the gas and coke oven industries. Installations already in operation or under construction are in capacities ranging from 2½ million to 17 million cu. ft. of gas per day. The W.W-D Electro Detarrer (*illustrated on the left*) gives over 99% efficiency in tar fog extraction. The advantages of complete tar fog removal are being increasingly recognised.

Other Whessoe products are listed opposite.

THE RANGE of— WHESSOE PRODUCTS

TAR EXTRACTORS

In addition to the W.W-D Electro Detarrer (*on the left*) the Whessoe Company makes the W.Z Disintegrator. It is a fan type machine for tar fog removal from producer gas and other gases.

TANKS

Welded or riveted tanks up to capacities of 10,000 tons are built by the Whessoe Company for any gas works or by-product purposes—water, tar, oil, benzole, etc. Cast iron tanks delivered in sections are also built at competitive prices.

STEEL PLATE WORK

Under this heading come welded or riveted gas connections, bunkers, hoppers, and process vessels of all kinds. The Whessoe Company is active in making all work of this type.

WEIGHBRIDGES

Whessoe weighbridges are modern design machines and exceptionally sturdy. They are fitted with automatic dials, ticket printers, or plain steelyards at customers' option.

GASHOLDERS

The Whessoe Company devotes itself to the competent design, manufacture, and erection of gasholders of all sizes—spiral, column guided or pressure types.

PURIFIERS

Any type of purifier work is within the scope of the Whessoe Company's foundry and machine shops, which are staffed to secure the highest class of work. Whessoe offers a special design of purifier gas preheater.

SCRUBBERS

The Whessoe Rotary Scrubber continues to be installed on account of its great reliability and the permanence of its washing surfaces. It is a multi-staged washer of proved performance for ammonia and benzole extraction.

CONDENSERS

Individual designs based on correct data enable the Whessoe Company to build condensers which operate efficiently whatever the special conditions.

All these Whessoe products are described in separate technical and illustrated publications. If you are interested in any item please write for literature—prices are also promptly available on application.

WHESSOE

FOUNDRY & ENGINEERING Co. LTD.

Head Office & Works DARLINGTON ENGLAND

London Office 25 VICTORIA STREET, S.W.1

THE MELTHAM SILICA FIRE BRICK

COMPANY, LIMITED,

MELTHAM, near HUDDERSFIELD.

TELEGRAPHIC ADDRESS: "REFRACTORY," MELTHAM. TELEPHONE: 21 MELTHAM.

STAND AT THE BRITISH INDUSTRIES FAIR, BIRMINGHAM, 1933.

Minimum of Expansion Guaranteed. **Satisfactory Results Assured.**

MANUFACTURERS OF HIGH-CLASS

SILICA BRICKS AND BLOCKS

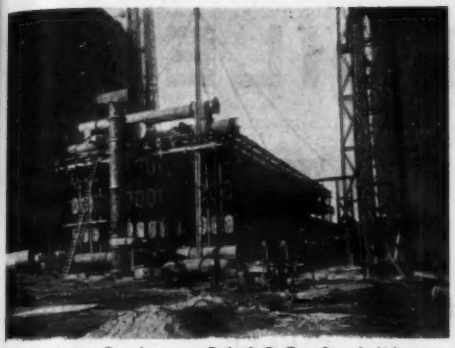
for GAS WORKS and COKE OVEN PLANTS

To any Design. ***As Supplied to some of the Largest Works in the Country.***

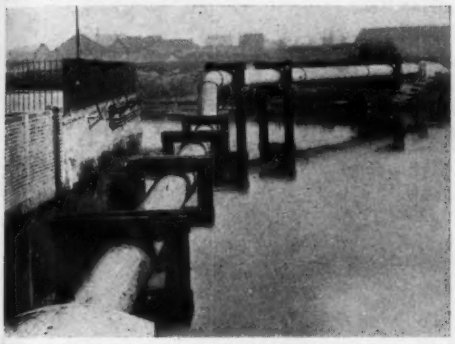
VERTICAL and SILICA HORIZONTAL RETORTS

A SPECIALITY.

REFERENCES GIVEN. **ENQUIRIES INVITED.**
SAMPLES FORWARDED ON REQUEST.



Atmospheric Condensers, G. L. & C. Co., Southall Station.



30" Steel Main over River Wandle, Wandsworth and District Gas Company.

MAINLAYING AND GASWORKS CONSTRUCTION

WILLIAM PRESS & SON

Civil Engineering Contractors,

38, OLD QUEEN STREET, LONDON, S.W.1

'Phone: WHITEHALL 1752, 2961.

'Grams: "UNWATER, PARL."

WE ARE SPECIALISTS IN ALL TYPES OF MAINLAYING AND GASWORKS CONSTRUCTION.

• • • •

EMERGENCY WORK

We have a Large Staff of skilled men on call at any hour of the day or night.

DEPOT PHONES (DAY & NIGHT)

TOTtenham 2665/6—ADVance 3771—LIBerty 3229

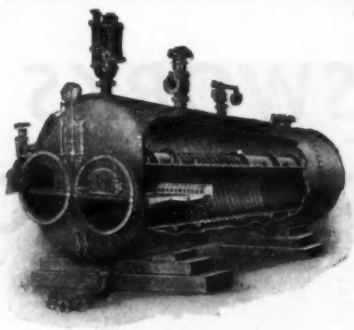
A typical Steel Main in course of construction.

24" Steel Main, Dagenham and Grays.

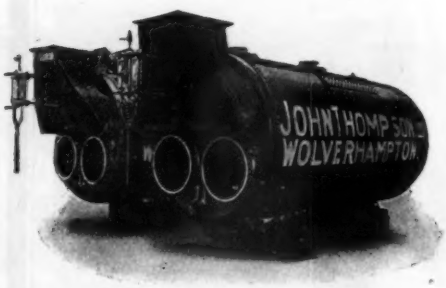
THOMPSON BOILERS

THOUSANDS OVER A CENTURY OF ENGINEERING. **WORKING**

"JOHN THOMPSON" BOILER
with Dished Ends and Corrugated Sections



"JOHN THOMPSON" ECONOMIC BOILER



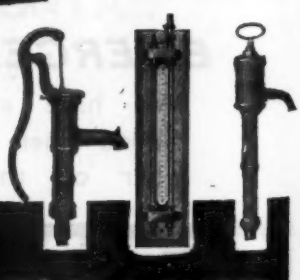
JOHN THOMPSON (WOLVERHAMPTON), LTD.
WOLVERHAMPTON
London Office: Imperial House, Kingsway, W.C. 2

METERS
PRESSURE GAUGES
SYPHON PUMPS

SLOT METERS
Simple, Strong, Compact, Accurate
1d. or **1s.** or **Two-Coin**

DRY METERS
Standard High Capacity and small High Capacity

Station Meters, Test Meters, Brasswork



Sole Agents in Scotland for "RENRUT" SERVICE CLEANSERS

DAVID GRANT & CO.,
EAST CROSSCAUSEWAY, EDINBURGH.
Telegrams: DAGRAN
Telephone No 41574

ESTABLISHED 1855

BIGGER COKE SALES

DISPLAY AND SELL MORE

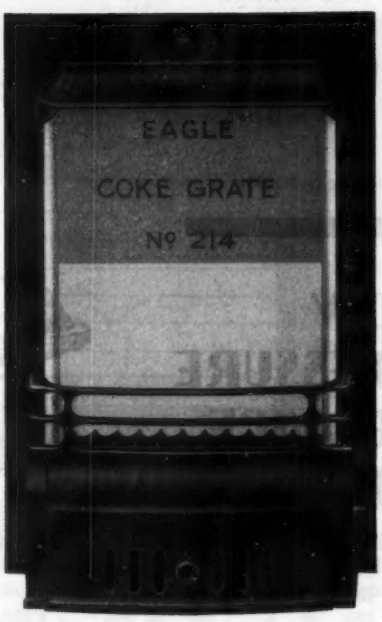
EAGLE

GAS-COKE GRATES

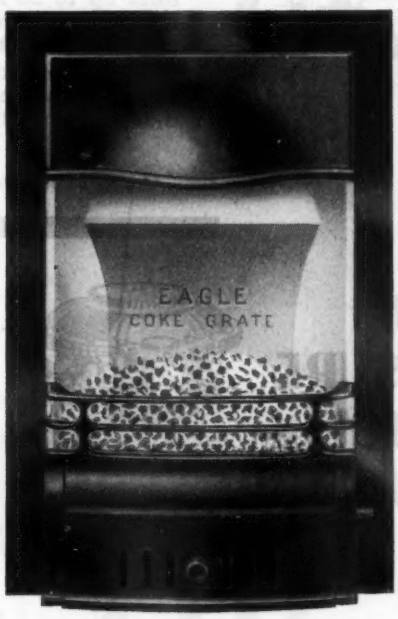
A display of "EAGLE" GAS-COKE GRATES in your Showrooms will prove an attraction hard to resist, particularly if you instal a working model.

These labour-saving Grates, providing a bright glowing fire without the disadvantages of smoke and soot, are becoming increasingly popular, and you can ensure a big increase in your coke sales by bringing their merits to the notice of your consumers.

A variety of designs and finishes are available.



The EAGLE, No. 214
Complete Interior



The EAGLE, K.1042
Complete Interior

EAGLE RANGE & GRATE CO. LTD., ASTON, BIRMINGHAM 6

Radiation

Donkin GAS GOVERNORS & REGULATORS

Meet electrical competition with the strong asset of satisfied consumers.

This can be done by maintaining an even and constant pressure on their premises at all periods of the day and night.

To ensure this use

FIG. 669A.

The Donkin Regulator

The most efficient appliance for regulating ordinary distribution pressures.
It is cheap, well made and thoroughly tested.
Suitable for Gas Meters, Fires, Cookers, Geysers, Radiators, etc.

For pressures not exceeding 8 in. water pressure.

For High Pressure Gas Distribution Schemes The Donkin (Reynolds' Type) Governor

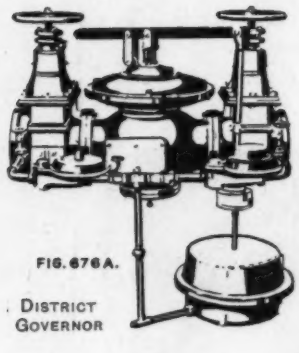


FIG. 676A.

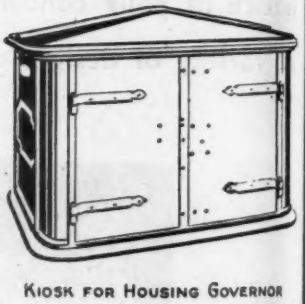
DISTRICT GOVERNOR

is daily proving its great value in the majority of high pressure gas installations throughout the World.

It will reduce gas from any pressure on the inlet up to 50 lbs. per square inch down to ordinary district pressure with absolute certainty of action under all conditions.

A gas undertaking in the South of England has 65 of these Governors in use, and over 5,000 of our Regulators of various types

Governors supplied to suit every possible condition.



KIOSK FOR HOUSING GOVERNOR

HIGH PRESSURE SERVICE REGULATORS

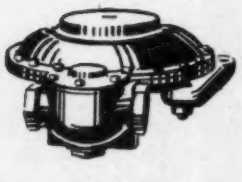


FIG. 623.

For pressures up to 50 lbs. per square inch.

LOW PRESSURE SERVICE REGULATORS

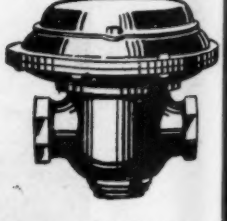


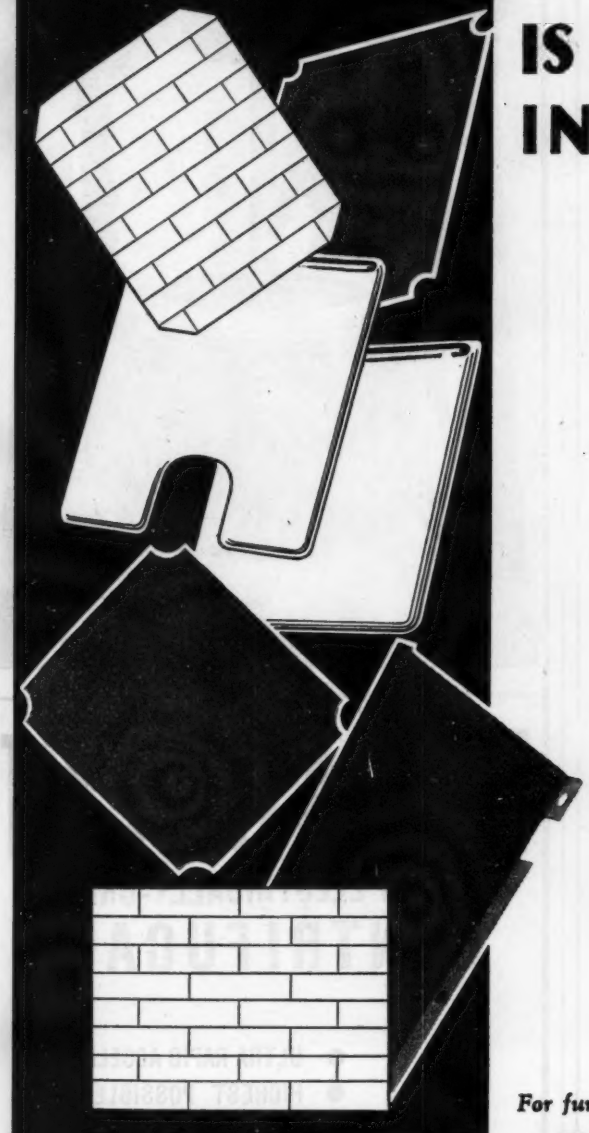
FIG. 587A.

This regulator is suitable for mains where the pressure is boosted up to 2 lbs. per square inch.

SAFETY CUT-OFF VALVES

THE BRYAN DONKIN CO. LTD., CHESTERFIELD

"CONSTANCY"



IS REPRESENTED
IN OUR ENAMELS

Pursue the safest course and place your orders for heat-resisting enamelware with an undertaking which specializes in this class of work.

"Constancy" is our watchword, and our linings, trays, and splash plates are noted for their excellence of

**QUALITY
WORKMANSHIP AND
DESIGN**

For further particulars apply—

NATIONAL
ENAMELS, LTD.,
53 NORMAN ROAD, GREENWICH, S.E.10
TELEPHONE: GREENWICH 2266-7

The component parts are few and good.

THE MECHANISM OF THE "MILNE TWO COIN" OPTIONAL METER SIMPLE AND RELIABLE

May we send you a sample?

Milne's Meters Ltd
Milton House Works
·EDINBURGH·
AND
VICTORIA ROAD, LEEDS

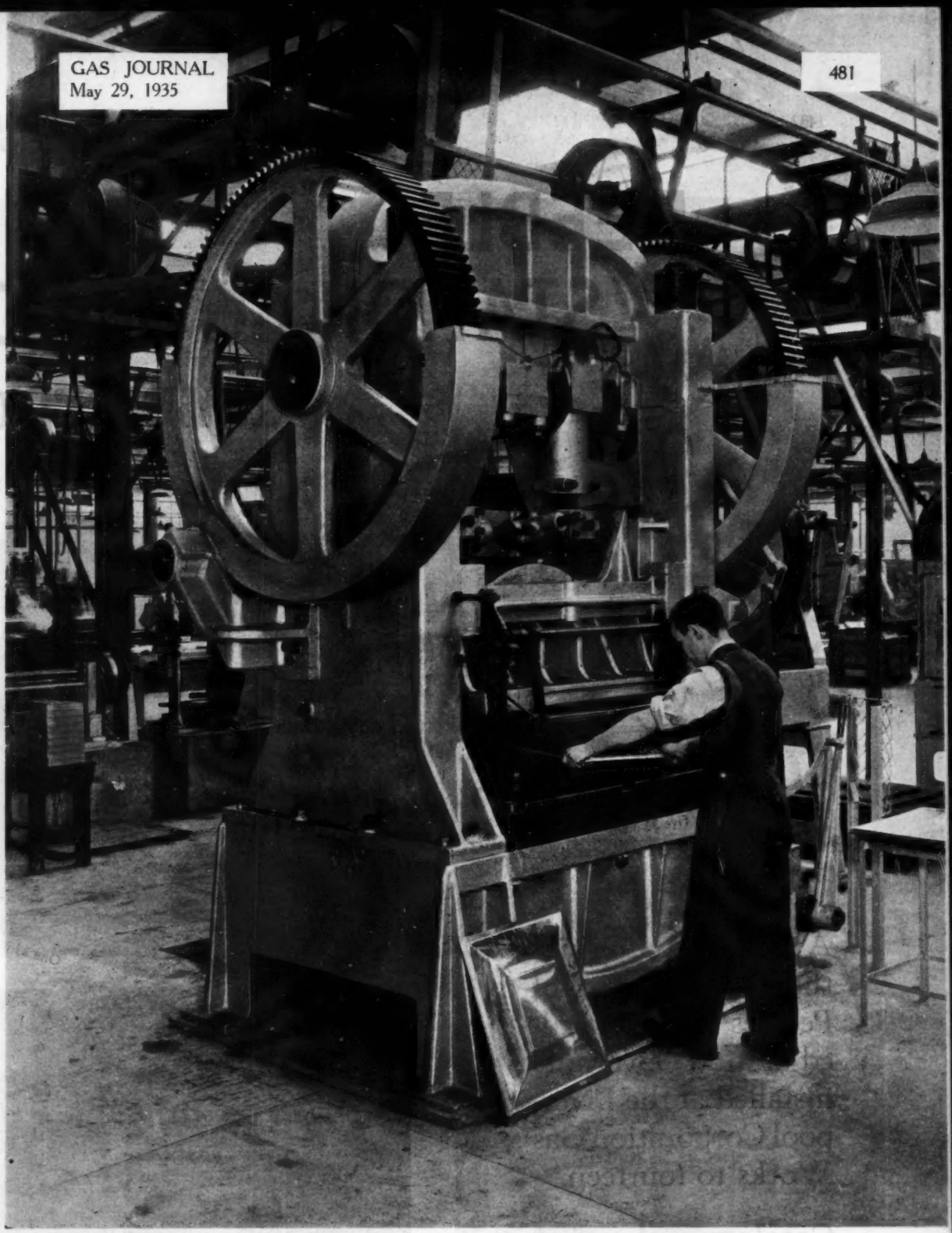
BROADBENT

DIRECT ELECTRICALLY-DRIVEN
CENTRIFUGALS

- ULTRA RAPID ACCELERATION
- HIGHEST POSSIBLE SPEED
- MINIMUM OSCILLATION
- SPECIAL DESIGN BASKET
- MASSIVE CONSTRUCTION
- LOW MAINTENANCE COST

BUILT TO GIVE
MANY YEARS OF SERVICE

THOMAS BROADBENT & SONS, LTD.
HUDDERSFIELD
Telephone: 5181 Huddersfield
Telegrams: Broadbent Huddersfield



POWER AND THE PRESS.

THOMAS GLOVER AND Co. LTD.

EDMONTON,
LONDON, N.18,
& BRANCHES.

PEEBLES STATION GOVERNORS at Liverpool

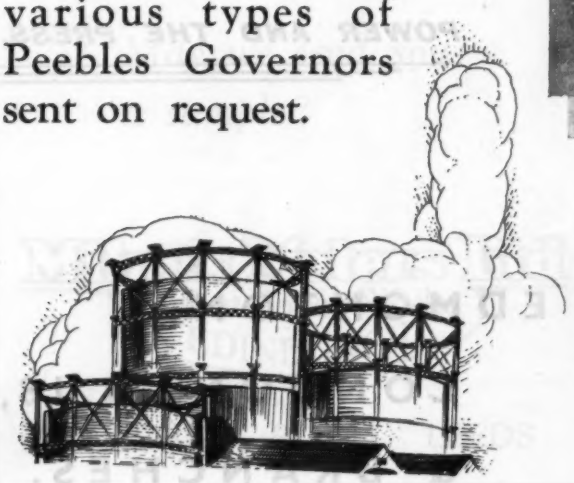
Five 30-inch.

One 24-in.; Two 18-in.

A recent order brings the total number of Peebles Water Loaded Station Governors installed at the Liverpool Corporation Gas Works to fourteen.

Catalogue showing various types of Peebles Governors sent on request.

Four 27-inch.



PEEBLES & CO. LTD.
TAY WORKS, BONNINGTON
EDINBURGH

K C U

for LONG SERVICE

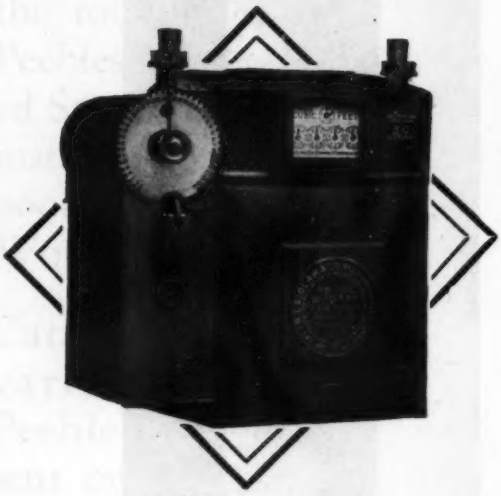
The flue and baffle of the "K.C.U." are made of special materials adopted after prolonged tests under heavy duty conditions. The "K.C.U." can be relied upon to stand up to a long period of everyday use. This statement is made with the utmost confidence.

In addition to the "Sunsheen" White and Chromium-plated finishes the "K.C.U." is offered in White Porcelain Enamel finish. All types have the lid and flue terminal of heat-resisting Bakelite.

ARDEN HILL & CO. LTD.
BIRMINGHAM 6

Radiation

SILENT ZONES
demand increased visibility
Parkinson Gas Lamps have been designed to ensure maximum visibility by the incorporation of unique combinations of directional reflectors, scientifically constructed to throw a wide beam of high candle power on to the test points and mid-span point. The diversity factor has been reduced by this means to the low value in some normal cases of 12-1, which was the ratio representing maximum visibility in the National Physical Laboratory tests at Sheffield. With the abolition of noise, safety becomes dependent upon sight rather than hearing, and increased illumination is imperative. This will be achieved by installing Parkinson Directional Lamps.
PARKINSON
W. PARKINSON & Co., BIRMINGHAM - LONDON - BELFAST
INCORPORATED IN PARKINSON & COWAN (GAS METERS) Ltd.



"LAIDLAW"

HIGH CAPACITY METERS

Give maximum capacity easily

Slots convertible for shilling or penny

R. LAIDLAW & SON (Edin.) LTD.

SIMON SQUARE WORKS, EDINBURGH

6, Little Bush Lane, Cannon Street, London, E.C.

ECONOMIC for BIG VALUE!

In WASH BOILERS that are UP-TO-DATE and TROUBLE FREE

GAS HEATED WASH BOILERS

No. 11 Pattern
with Strong Galvanized Case, Polished Pressed Aluminium Top Rim. Protector Case. Copper or Wood Lid and Brass Draw-off Tap.

VISIT OUR STAND AT BIF 1935 ENGINEERING AND HARDWARE SECTION BIRMINGHAM MAY 13-24 SEE OUR EXHIBIT

No. B414 BUILDING and HEATING SECTION

No. 12 Pattern
with Grey Mottled Porcelain Enamelled Case and Chromium Plated Tap. Copper or Wood Lid.

No. B.2 Pattern
Galvanized Iron Case. Rim of Cast Aluminium. Copper lid heavily tinned on inside. Protector Plate, with or without draw-off Tap.

No. 23 Pattern
with white Porcelain Enamelled Table Top. Grey Mottled Porcelain Enamelled Case and Chromium Plated Tap.

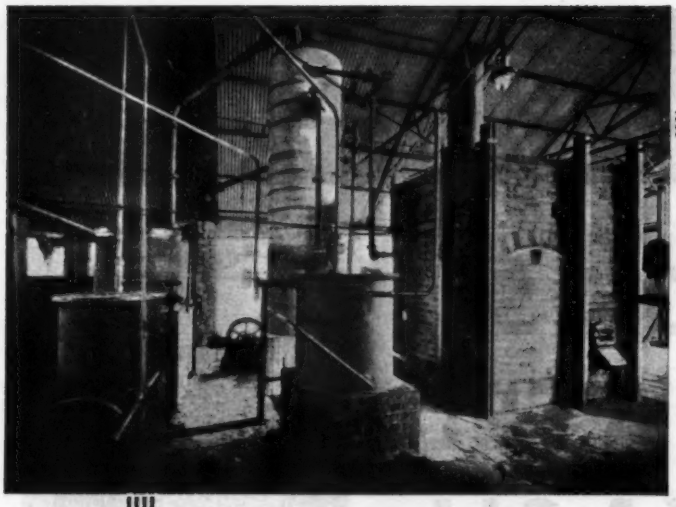
Agents for Scotland
MESSRS. MILNE & MITCHELL
75, BATH STREET, GLASGOW, C.2

No. 13 Pattern
Galvanized Corrugated Case, Polished Pressed Aluminium Rim. Copper or Wood Lid. Protector Case and Brass Draw-off Tap.

ECONOMIC GAS BOILER Co. LTD

JUNCTION MILLS, BURNLEY, LANCS.

Telephone: 3305 BURNLEY Telegrams: "Bluboilers" BURNLEY



A NEW ERA

in **TAR DISTILLATION**

A Really Continuous Plant

TAR DISTILLED IN THE NEW WILTON PROCESS
UTILIZING
PIPE STILLS & RECIRCULATION

Is Distilled without Pot Stills, in all Cast Iron, without Pressure, without Fire Risks, with lowest Fuel Costs, and gives Hard Pitch, with a continuous output of accurately Finished Product. Thermostatically Controlled with Fine Cuts. The Plant is suitable for Mixtures, Bitumen, etc. Distilling and Cracking Tar Oils, Low Temperature Tar Oils, Oil Revivification and Redistillation, Debenzolising, and can be adapted for Hydrogenation.

Full particulars and enquiries to

THE CHEMICAL ENGINEERING & WILTON'S PATENT FURNACE Co., Ltd.
76, VICTORIA STREET, LONDON, S.W. 1.

Telegrams: "EVAPORATOR, PHONE, LONDON." Telephone: VICTORIA 2417

TUBES

THE SCOTTISH TUBE CO., LTD.

34, ROBERTSON STREET, GLASGOW

"for all Gas Companies' requirements"

EWART'S

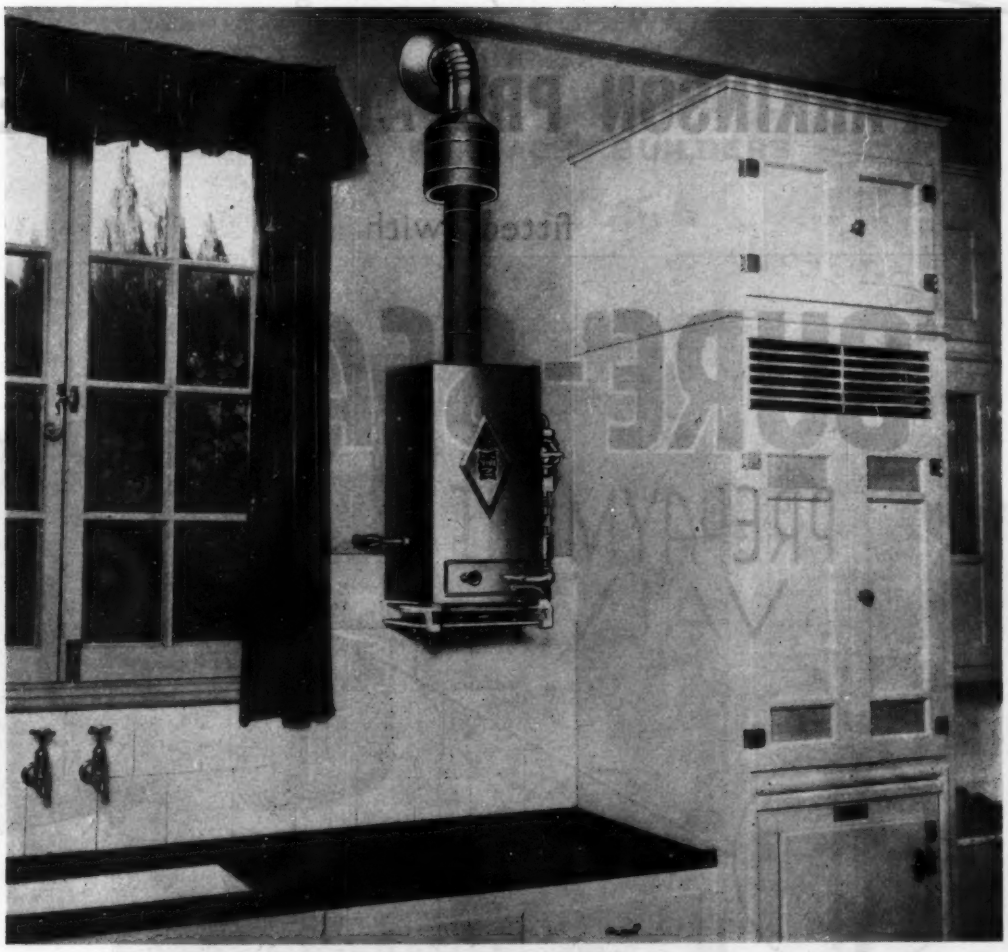
NEW "VIVO" INSTANTANEOUS WATER HEATER

ENTIRELY AUTOMATIC AND LABOUR-SAVING

HOT WATER INSTANTLY NIGHT OR DAY

At any time *Without Waiting* *At any Heat* *In any Quantity*

The claim can be made when Ewart's "VIVO" WATER HEATER is fixed that "constant hot water is provided throughout the house how, when and where required at just the right temperature and at the lowest possible working cost."



Fixed in the scullery the new "VIVO" Water Heater supplies Hot Water without previous storage, to bath, lavatory basin, &c., as well as constant service to the kitchen at any hour of the night or day.

PRICE £10-0-0

This modern method of water heating provides an all-time all-point service at small cost. Dimensions 21 in. x 11 in. x 9 in. Heating 2½ gallons per minute raised in temperature 40° Fahr.

EWART & SON LIMITED

346-350 EUSTON ROAD LONDON N.W.1

Telephone: Museum 2570 ESTABLISHED OVER A CENTURY *Telegrams: "Geyser London"* CVS-223

Reduce your "Unaccounted-for" Gas

by Fixing

PARKINSON PREPAYMENT METERS

fitted with the

"SURE-SEAL"

PREPAYMENT VALVE

(Patent Applied For)

W. A. PARKINSON & Co

LONDON · BIRMINGHAM · BELFAST

"Unregistered Gas"—A thing of the past

GAS WORKS PLANT

ELEVATING and CONVEYING PLANT
for handling all classes of material

COAL and COKE SCREENING
and
STORAGE PLANTS

STEEL STRUCTURAL WORK

BUNKERS - ROOFS - SCREENS

AERIAL ROPEWAYS and TRANSPORTERS

GAS RETORT INSTALLATIONS

FURNACE BUILDERS

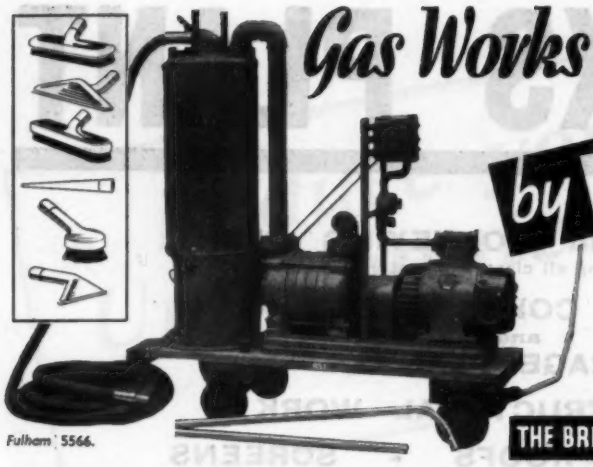
Rubber Belt Conveyor 450' 0" long, crossing Railway Main Line, handling material for Brick Making Plant

GOODALL, CLAYTON & Co. LTD.

'Phone: 75484 Leeds

LEEDS

'Grams: Vertical, Leeds



Gas Works Type Vacuum Cleaner

by B.V.C.

AS USED BY—

THE GAS LIGHT & COKE CO., NINE ELMS, SOUTHALL, BRENTFORD; CARDIFF GAS CO.; READING GAS CO.; BIRKENHEAD GAS DEPT., ETC., ETC.

Fulham 5566.

THE BRITISH VACUUM CLEANER & ENGINEERING Co LTD LONDON S.W.6

WRITE

W. SPENCER & SONS

SOUTHALL MIDDX.

FOR (AND FORMERLY OF **ELLAND**)

EST. 1888 PURIFIER **GRIDS** NO CONNECTION WITH ANY OTHER FIRM

C. & T. OXIDE DISINTEGRATORS

C. & T. DISINTEGRATORS were first used in the Gas Industry in 1910. To-day they are at work all over the world.

Free demonstrations are given anywhere in the United Kingdom.

Capacities range from 2 to 60 tons per hour.

C. & T. PORTABLE CONVEYORS

PORTABLE CONVEYORS have many uses in the Gas Industry—loading Coke, turning Oxide, stacking Coal, etc.

We make special Machines for charging and discharging Purifiers.

Portable Conveyors save up to 66% of handling costs.

'Phone: 3397 St. Helens

CRONE & TAYLOR Ltd.

Disintegrating and Conveying Engineers

Sutton Oak, St. Helens, Lancs.

'Grams: Crone Taylor Suttonoak

ELECTRIC WELDING SPECIALISTS

Consult us on any Welding Problem

Your enquiries will receive the personal attention of the Managing Director

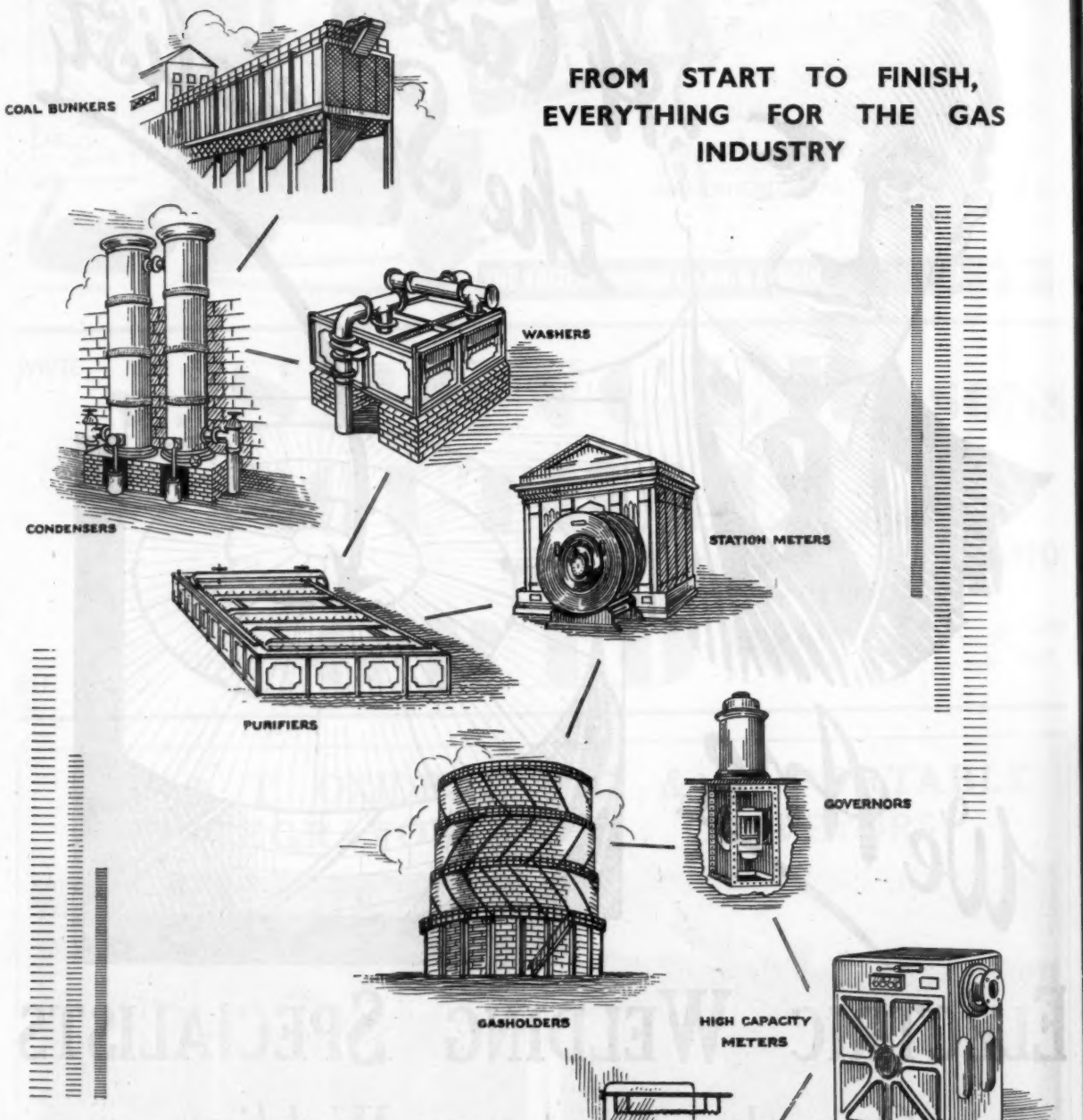
OXLEY ENGINEERING Co., LTD.

CLARENCE ROAD HUNSLET LEEDS

Telephone : 27468-9

Telegrams : OXBROS, LEEDS

London Office : Winchester House, Old Broad Street, E.C. 2 'Phone : London Wall 3731-2 'Grams : Asbengpro, Stock



WILLEY & Co., LTD.

Chief Offices & Works

EXETER

'Phone : 4064-5 'Grams : "Willey Exeter."

Other Branches

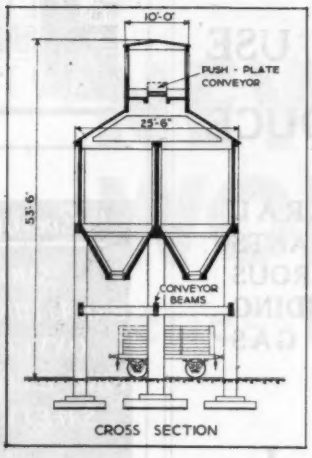
LONDON LEICESTER
MANCHESTER DARLINGTON
NEWPORT

F.C. CONSTRUCTION CO. LTD.

26, IRONGATE, DERBY.

ECONOMIC DESIGN

SAFE FOUNDATIONS

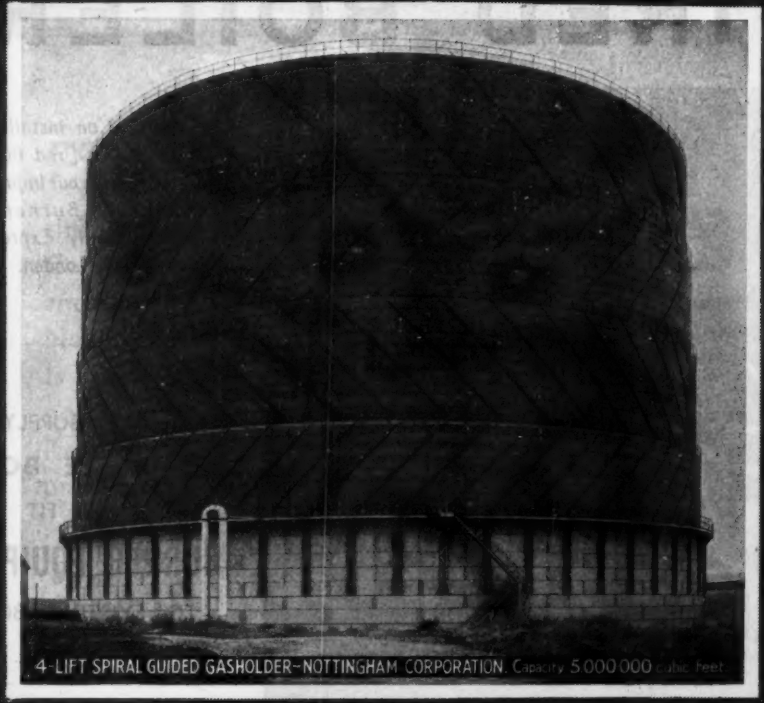


CROSS SECTION

SOUND WORKMANSHIP

ENQUIRIES SOLICITED

ESTIMATES FREE


4-LIFT SPIRAL GUIDED GASHOLDER-NOTTINGHAM CORPORATION. Capacity 5 000 000 cubic feet

GASHOLDERS AND TANKS OF ANY SIZE AND DESIGN

FRAME GUIDED SPIRAL. WATERLESS (M.A.N. PATENTS)

LONDON OFFICE: 5, VICTORIA ST. S.W.1.

PURIFIERS, STRUCTURAL STEELWORK
WELDED AND RIVETTED STEEL PIPES, BOILERS

CLAYTON SON & Co LD., MOOR END, HUNSLET, LEEDS

"TULLY" GAS

THE IDEAL GAS SUITED TO ALL MODERN NEEDS

ECONOMICAL IN USE AND CHEAP TO PRODUCE

THERE ARE SEVERAL HUNDRED "TULLY" PLANTS IN USE AND NUMEROUS GAS WORKS ARE SENDING OUT ALL "TULLY" GAS

Sole Makers and Patentees:

TULLY, SONS & Co., LTD.
MILLGATE,
NEWARK-ON-TRENT, ENGLAND.

Specify Drykos FIRE CEMENT

FOR JOINTING & WASHING VERTICAL RETORTS

Drykos is an approved Dry Fire Cement manufactured to suit varying conditions. "Standard" is recommended for Fireclay Retorts and "H.3" for Silica Retorts and Silica Bricks. Full particulars from sole manufacturers:

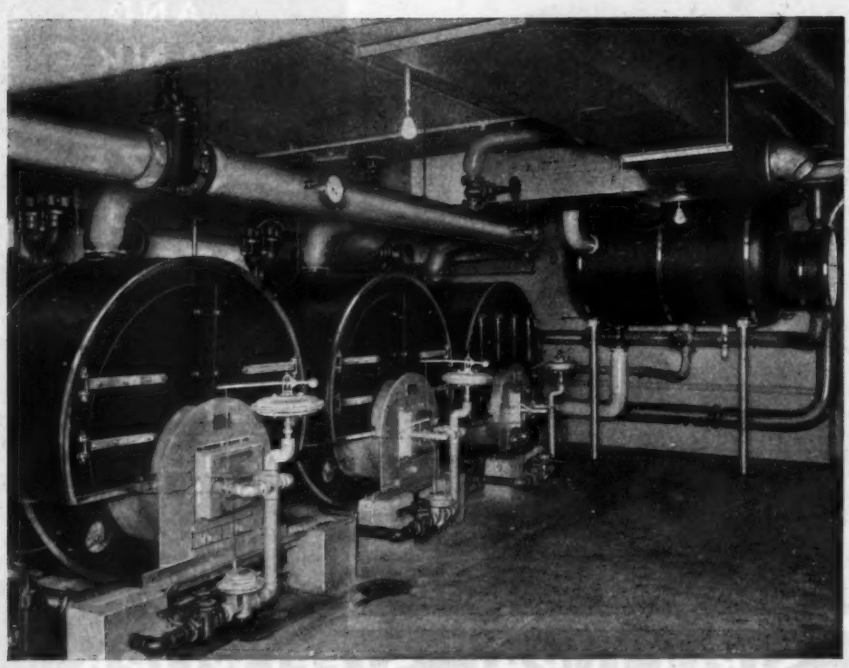
PURIMACHOS LTD., BRISTOL 2

"Everything for Safety Everywhere."

SMOKE HELMETS. GAS MASKS.
BREATHING APPARATUS OF ALL PATTERNS
OXYGEN RESUSCITATING APPARATUS.
FIRE EXTINGUISHERS. FIRST-AID OUTFITS
SAFETY AND PROTECTIVE APPLIANCES OF ALL DESCRIPTIONS.

SIEBE, GORMAN & CO. LTD.,
WESTMINSTER BRIDGE ROAD, LONDON, S.E.1.
Telegrams: "Siebe, Lamb, London" Telephone No.: HOP 3401 (2 lines)

GAS-FIRED BOILERS



Part of an installation of 5 Gas-fired Boilers fitted with our Improved Radiant Burners at the "Daily Express" building, London.

WE SUPPLY
COMPLETE BOILERS
OR FIT
BURNER EQUIPMENT
TO EXISTING BOILERS

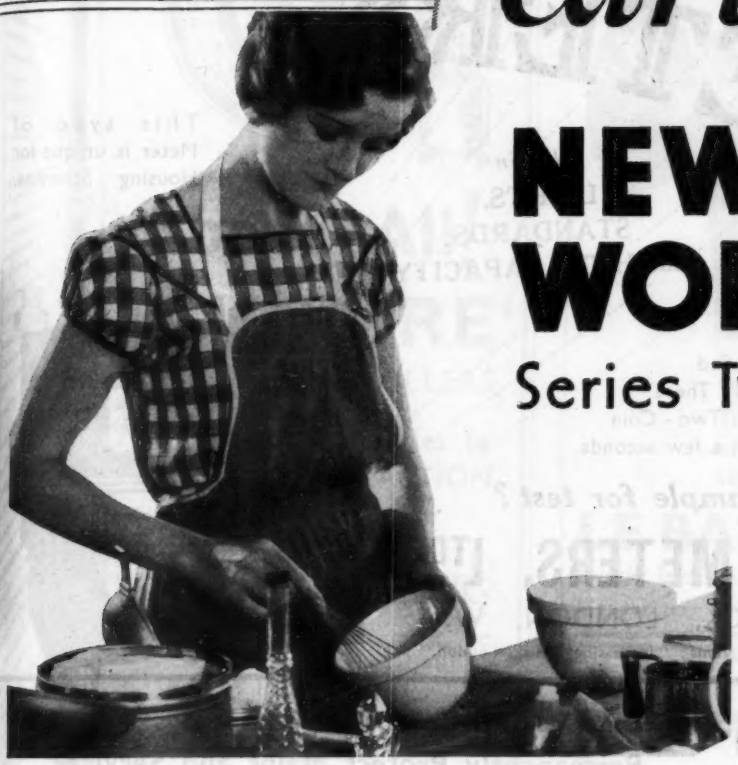
BRITISH FURNACES LTD., DERBY ROAD, CHESTERFIELD

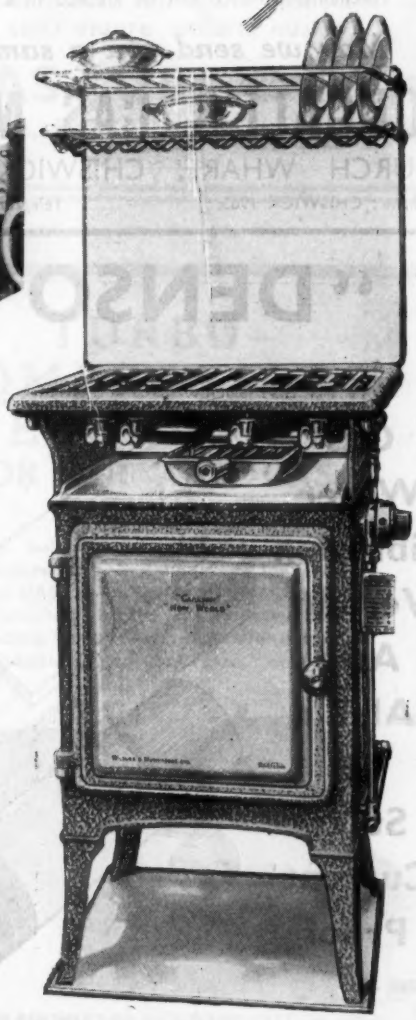
THE

Carlton

NEW WORLD

Series Two





FOR the Industry, "Get up-to-date with Gas" brings to mind at once this fine series of Carlton New World Cookers. Unimpeachable workmanship and finish have interpreted the popular New World features in a way that is ensuring "sales on sight." This porcelain enamelled cooker with its Regulo-controlled oven completely meets present-day requirements.

Illustrated Price Lists on application

WILSONS & MATHIESONS, LTD.

CARLTON WORKS, ARMLEY, LEEDS

Radiation
PROPRIETORS

DOUGALL'S SUPER HIGH CAPACITY METERS

Also in
LIGHTS, STANDARDS and HIGH CAPACITY

This type of Meter is unique for Housing Schemes.

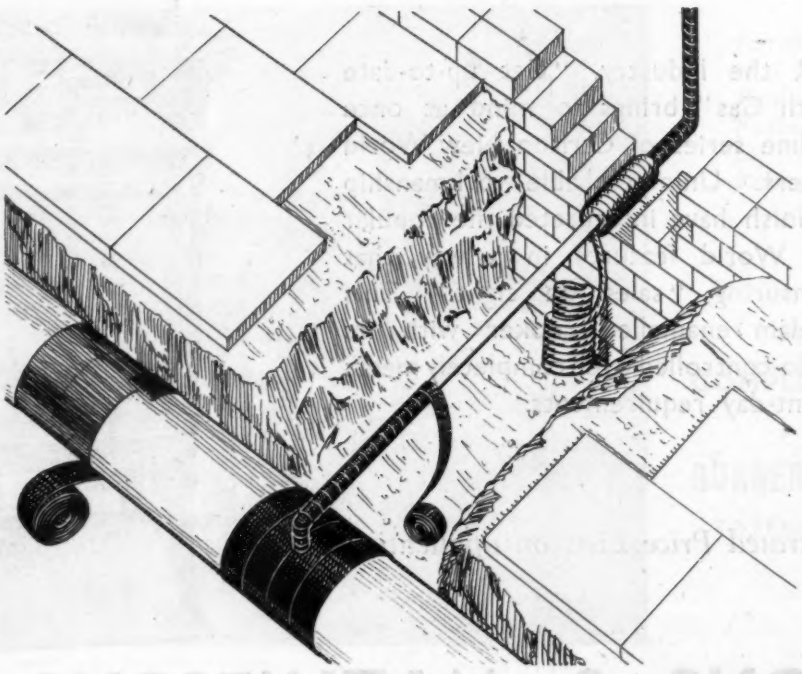
Large Capacity in Small Cases. Correct Registration from Pilot jet to Peak Loads with absorption and oscillation practically negligible. These Meters can be fitted with our Two-Coin Mechanism, which can be altered in a few seconds.

May we send you a sample for test?

DOUGALL'S GAS METERS, LTD.
CHURCH WHARF, CHISWICK, LONDON, W. 4
Telephone: CHISWICK 1965. *Telegrams:* "Increasing, Chisk, London."

"DENSO" Plastic Anti-Corrosive Wrappings Permanently Protect Mains and Services

Gas
Water
Vibration
Vermin
Acid
Alkali
&
Stray
Current
Proof



British Patent Nos.
293,835
375,433
388,275
415,386

—

Write for Illustrated Brochure giving Proofs and Particulars

—

USED IN ALL COUNTRIES

BRITISH MADE by **BEWARE OF IMITATIONS**

WINN & COALES, Ltd. (Dept. C), 40, Trinity Square, London, E.C. 3

Works: 9-10, North-East Passage, London, E. 1

Above All!
'GUNFIRE'
LIGHT CONTROLLERS

Save Countless Mantles by their GRADUAL ACTION

If you want your
STREET LIGHTING
to be up-to-date—it must be
AUTOMATIC

If you want it to be
SUCCESSFUL
you must have
'GUNFIRE' CONTROLLERS

The British, Foreign & Colonial
AUTOMATIC LIGHT CONTROLLING CO. LTD.
BOURNEMOUTH

London Office:
Africa House,
Kingsway, W.C. 2.

ENGINEERING AND HARDWARE SECTION
BIRMINGHAM
MAY 25-31
SEE OUR EXHIBIT
Stand No. B 326

for **COMPLETE SATISFACTION**

BRITISH **GF** MADE

use the fittings with 70 years' reputation for quality and reliability. **GF** embody all features that constitute a high-class fitting. Metal—Perfectly annealed and non-porous. Threads—True to British Standard. True in alignment with chamfered entrance. Stringent inspection and tests ensure uniform quality.

LE BAS TUBE Co., LTD.
Dock House, Billiter Street, London, E.C. 3
Manchester - Glasgow - Belfast

TURBO-COMPRESSORS & EXHAUSTERS
FOR AIR AND GAS.

* * *

We build a complete range of Compressors & Exhausters for air and GAS, suitable for all purposes connected with the Gas Industry, including Turbo-Compressors for large capacities, as illustrated below.

WRITE FOR PAMPHLET No. 101B GIVING PARTICULARS:—

REAVELL & Co., LTD.,
RANELAGH WORKS, IPSWICH.
TELEGRAMS: REAVELL, IPSWICH. TELEPHONE: 2124 & 5

MAXIMUM VALVE PORT AREA MEANS

MAXIMUM GAS FLOW per UNIT PRESSURE

MINIMUM PRESSURE LOSS

PUNCTILIOUS REGISTRATION

ALL EMBODIED IN THE NEW PIVOTED PLOUGH VALVE

Grease-Cup Lubrication at all Vital Points

Long Period Tests at Top Speeds Prove Reliability and Durability

AN OUTSTANDING PRODUCT :: THERE IS NO BETTER METER

J. H. ROBINSON & Co. (LIVERPOOL) LTD.

Chief Office & Works: MILL LANE, OLD SWAN, LIVERPOOL

'Grams: DIAL, LIVERPOOL

Branches: EDINBURGH & DUBLIN
'Grams: DIAL, LEITH or DUBLIN

'Phone: OLD SWAN, 36-634

James Southerton & Son, Martineau & Smith

1800 - - 1935

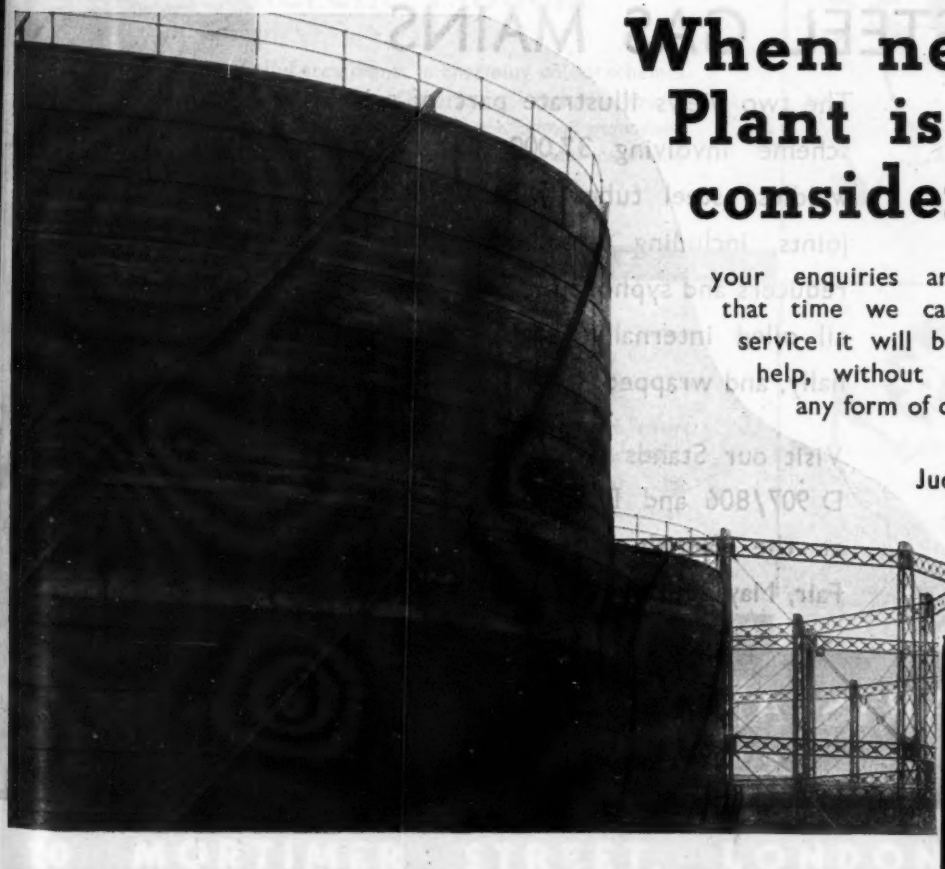
From ⅛th Stop Cap to 3" Main Cock

and

EVERYTHING IN BRASS FOR THE GAS INDUSTRY

New Address

MARTSMITH WORKS **SUTTON COLDFIELD**



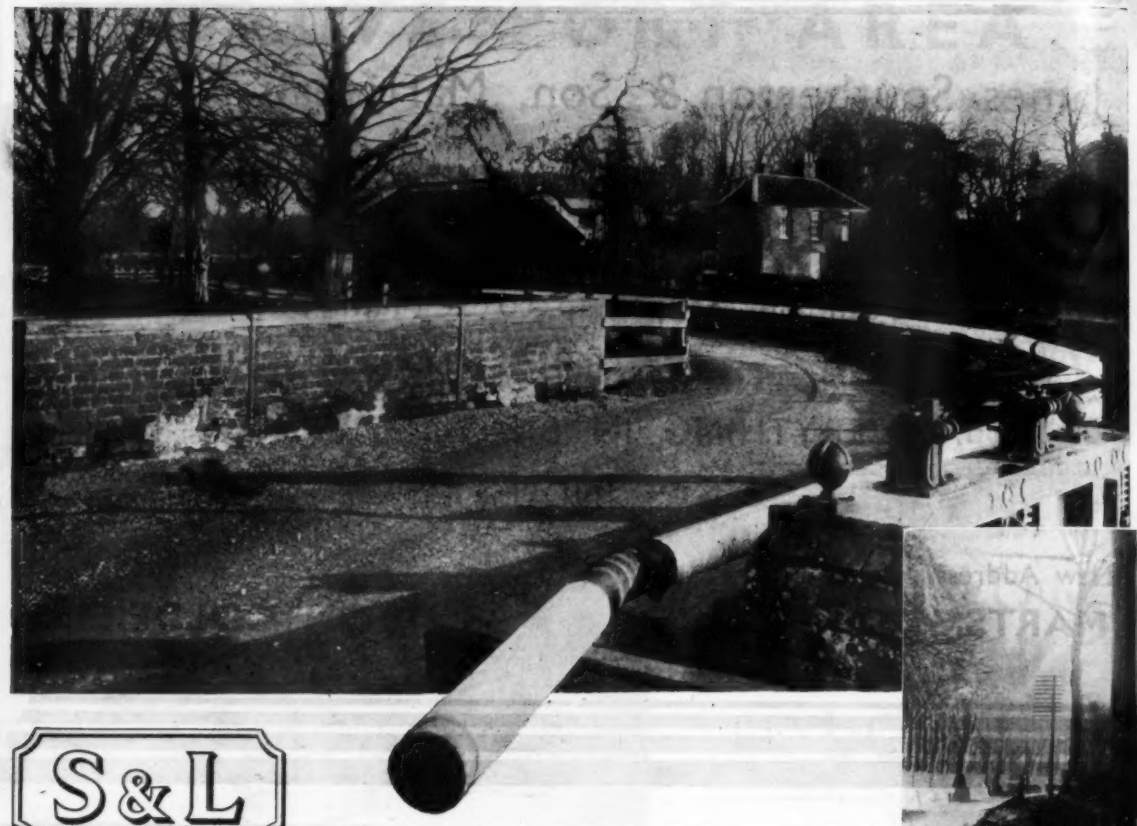
When new Gas Plant is under consideration..

your enquiries are invited. If at that time we can be of technical service it will be our privilege to help, without placing you under any form of obligation.

Judge us entirely on the merits of our tender.

HORSELEY BRIDGE & THOMAS PIGGOTT LTD.

TIPTON, STAFFS



S&L

STEEL GAS MAINS

The two views illustrate part of a scheme involving 37,000 feet of weldless steel tubes with welded joints, including also bends, tees, reducers and syphons. These were all oiled internally, coated externally, and wrapped.

Visit our Stands Nos. D 601/500, D 907/806 and D 907/808 at the British Industries Fair, May 20th to 31st.

MEMBERS OF THE SOCIETY OF BRITISH GAS INDUSTRIES · 1905 ·

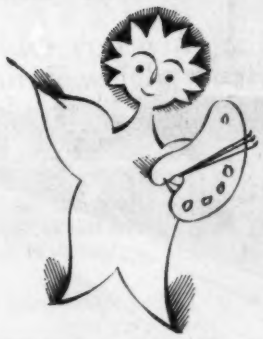
STEWARTS AND LLOYDS LTD.

GLASGOW BIRMINGHAM LONDON

PORTCULLIS

Colour in Gas Fires

"Portcullis" Gas Fires are made in twelve beautiful new colours and metal finishes. To-day, more and more people realise the importance of choosing their household fittings to harmonize with their decorations. To these people "Portcullis" Gas Fires make an instant appeal.



PORTCULLIS

Efficiency in Gas Fires

No fire gives more heat or more healthy heat ; no fire uses less gas ! And heat is radiated in that region of the spectrum so vital to health—a remarkable technical achievement only arrived at after much research.

PORTCULLIS

Many Different Models

A wide range of beautiful treatments in charming colour schemes may be seen at the Bratt Colbran Galleries. We invite you to make use of this Showroom Service. If you cannot personally accompany customers send them with your business card and full trade discount will be credited to you.

PORTCULLIS

Architecturally Designed

The efficiency of "Portcullis" Gas Fires can be relied on, they are the result of careful co-operation between Architect and Technical expert. In appearance—as modern as the hour. In performance—an outstanding example of what modern technical achievement can mean to the home.

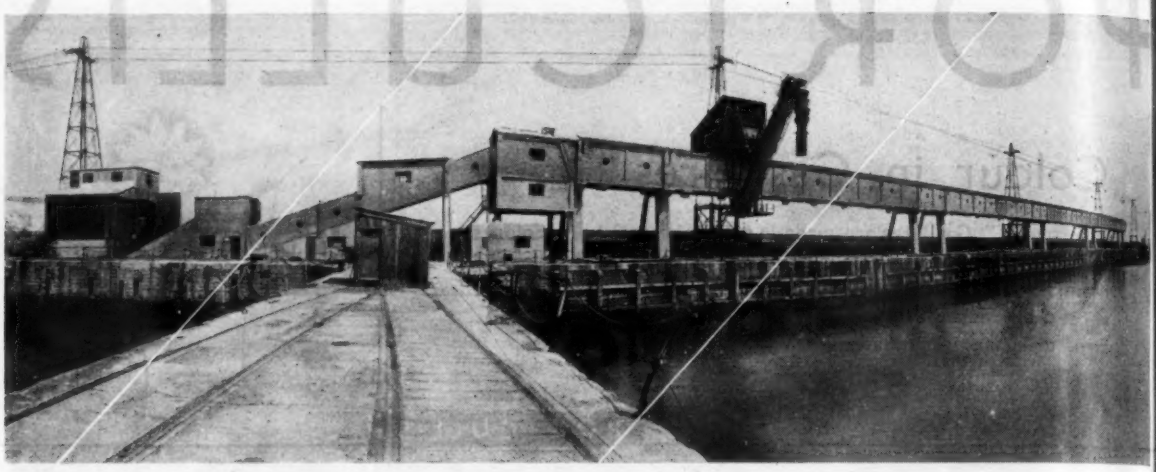
PORTCULLIS

SEE ALSO ANNOUNCEMENT ON PAGE 592.

BRATT COLBRAN LIMITED

10 MORTIMER STREET, LONDON W.1.

FOR LOADING AND UNLOADING PLANTS



OF ANY CAPACITY

CONSULT FRASER & CHALMERS ENGINEERING WORKS

Many of the largest handling plants in Great Britain, and Overseas, handling up to thousands of tons per hour, testify to the unrivalled experience of this company in the design, manufacture and installation of handling plants. For coal and coke plants especially —conveying, screening and grading—this expert knowledge can prove exceptionally helpful.

FRASER & CHALMERS ENGINEERING WORKS **ERITH, KENT**

(Proprietors, The General Electric Co., Ltd.) London Office, Magnet House, Kingsway, W.C.

Associated with Robins Conveying Belt Co.

TWO-COIN METER

OPTIONAL PREPAYMENT WITH SINGLE SLOT

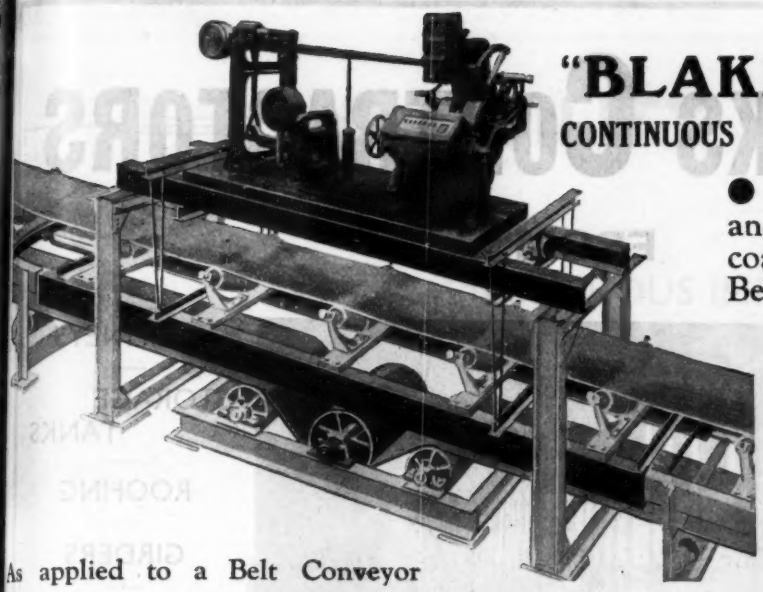
THE GAS METER COMPANY LTD.

Which can be set for
PENNIES ONLY
or
SHILLINGS ONLY
or
BOTH { SHILLINGS & PENNIES
AT OPTION OF UNDERTAKING

For full particulars apply to
238, KINGSLAND ROAD, LONDON, E.2

Branches :
OLDHAM - DUBLIN - MANCHESTER

THE
"BLAKE-DENISON"
CONTINUOUS WEIGHER AND RECORDER



As applied to a Belt Conveyor

● Provides you with reliable and accurate weight-records of coal, coke, etc., passed over Belt or Bucket Conveyors.

It is in use at leading GAS WORKS throughout the world.

Further information will be given on request.

SAML. DENISON & SON
LTD.
HUNSLAKE, LEEDS

INSULATING BRICKS — RECUPERATOR TUBES
Special semi silica quality for Segmental Retorts
with no Expansion or Contraction at 1400° C.
HARRIS & PEARSON, LTD., STOURBRIDGE, ENGLAND
Telephone: BRIERLEY HILL No. 7281 (2 lines).

Geyser goes —— Flue remains
THE SIMPLICITY OF THE "EVERITE" SLIP SOCKET

SLIDING COLLAR TO COVER PIPE JOINT

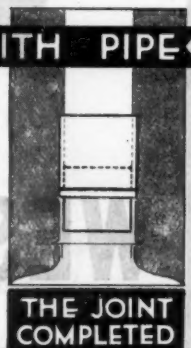
The "EVERITE" Asbestos-Cement Slip Socket enables a geyser, water heater, or similar gas appliance to be moved from its position quickly and easily without any disturbance of the flue stack above. The fitting consists of an adapter which makes a push-fit over the metal outlet from the geyser. The top of this adapter butt-joints with the spigot of the flue-pipe, the joint being sealed by a sliding collar which seats on the outer rim of the adapter. When it is desired to remove the geyser, simply slide the collar upwards, temporarily support the fixed pipe, and the geyser and adapter can then be withdrawn freely.

ADAPTER TO BUTT-JOINT WITH PIPE

REGISTERED DESIGN No. 745486

TAC

SOLE MANUFACTURERS
TURNERS ASBESTOS CEMENT CO.
BRANCH OF TURNER AND NEWALL LTD.
TRAFFORD PARK, MANCHESTER
Asbestos House,
SOUTHWARK STREET, LONDON, S.E.1



F.P.16

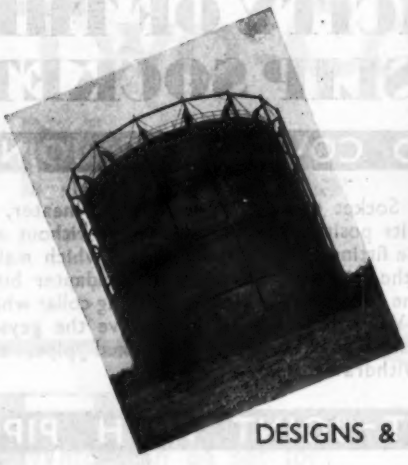
GASWORKS CONTRACTORS

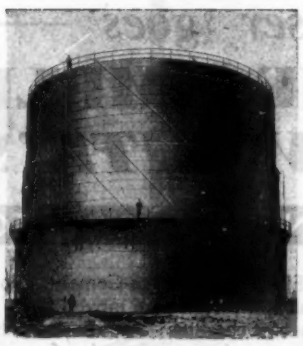
FROM

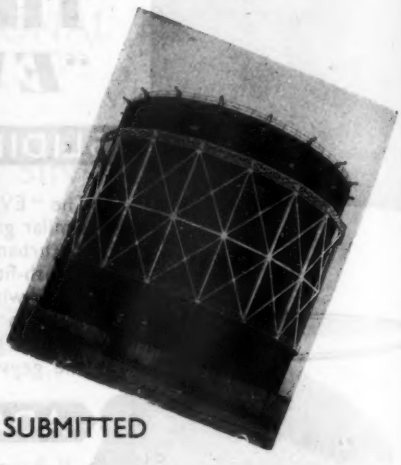
CONDENSERS
WASHERS
SCRUBBERS
PURIFIERS
RETORT BENCH IRONWORK
GENERAL CASTINGS

CHIMNEYS
STORAGE TANKS
ROOFING
GIRDERS
RIVETED AND WELDED STEEL PIPES
STRUCTURAL STEELWORK

GASHOLDERS TO GAS VALVES







BRITISH MATERIAL
BEST WORKMANSHIP
DESIGNS & ESTIMATES WILLINGLY SUBMITTED

SEND YOUR ENQUIRIES TO

WESTWOOD & WRIGHTS LTD

BRIERLEY HILL — STAFFS.

Telephone : 7101-2 BRIERLEY HILL *Telegrams* : WESTWOOD WRIGHTS

THE UTILITY TRIO

- NUMEROUS IMPORTANT FEATURES
- LARGE VARIETY OF SIZES

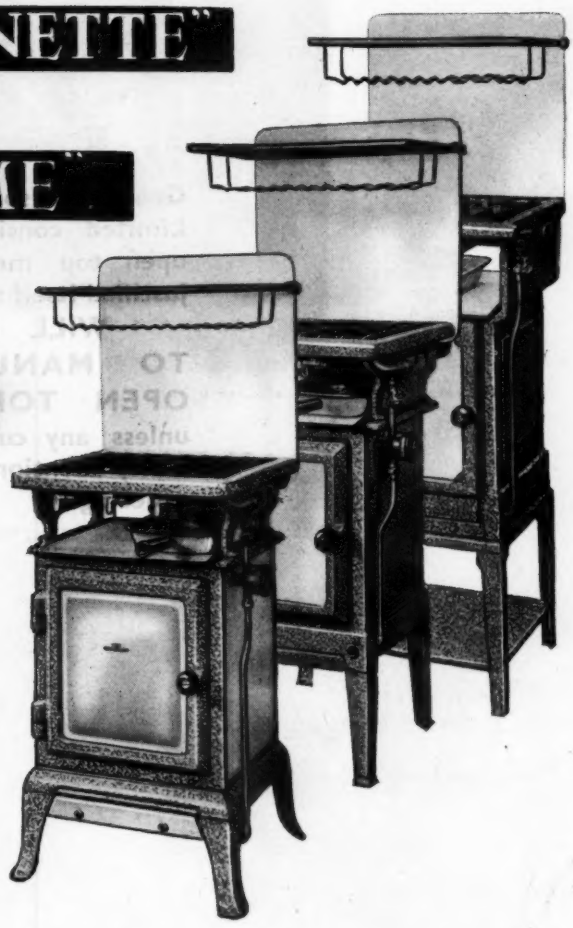
"KITCHENETTE"

"NEWHOME"

AND

"BAKERLOO"

COOKERS



THE LATEST ADDITION TO OUR RANGE
THE "BAKERLOO - SUPERL"
HAS A PARTICULARLY ATTRACTIVE APPEARANCE AND A SAMPLE DISPLAYED IN YOUR SHOWROOMS WILL PROVE ITS POPULARITY

STOVES LIMITED, RAINHILL, LIVERPOOL

TELEGRAMS:
STOVES, RAINHILL

TELEPHONE:
PRESCOT 6255/6

GEORGE WILSON GAS METERS LIMITED

NEW POLICY

George Wilson Gas Meters Limited consider that the open top meter has not justified itself and, therefore,

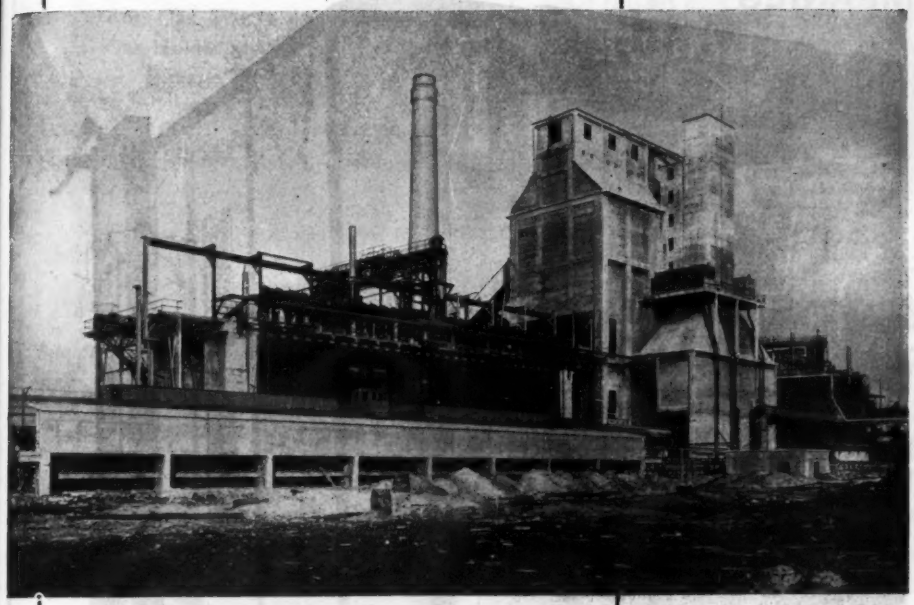
WILL CEASE TO MANUFACTURE OPEN TOP METERS

unless any customer specifically mentions them when ordering.

GEORGE WILSON GAS METERS LTD.

COVENTRY, London, Manchester, Blackpool, Leeds

A MODERN GAS WORKS PLANT



CLIENTS :
MESSRS. KOPPERS COKE OVEN CO., LTD.

THE ABOVE ILLUSTRATION SHOWS A 3,600 TONS BUNKER, QUENCHING TOWER, COKE OVEN FOUNDATIONS AND COKE WHARF DESIGNED AND CONSTRUCTED BY US AT THE GAS LIGHT AND COKE COMPANY'S BECKTON WORKS.

COMPLETE DESIGNS AND ESTIMATES SUBMITTED FREE OF CHARGE.

PETER LIND & CO LIMITED

8, BRUNSWICK HOUSE, CENTRAL BUILDINGS, WESTMINSTER, S.W.1

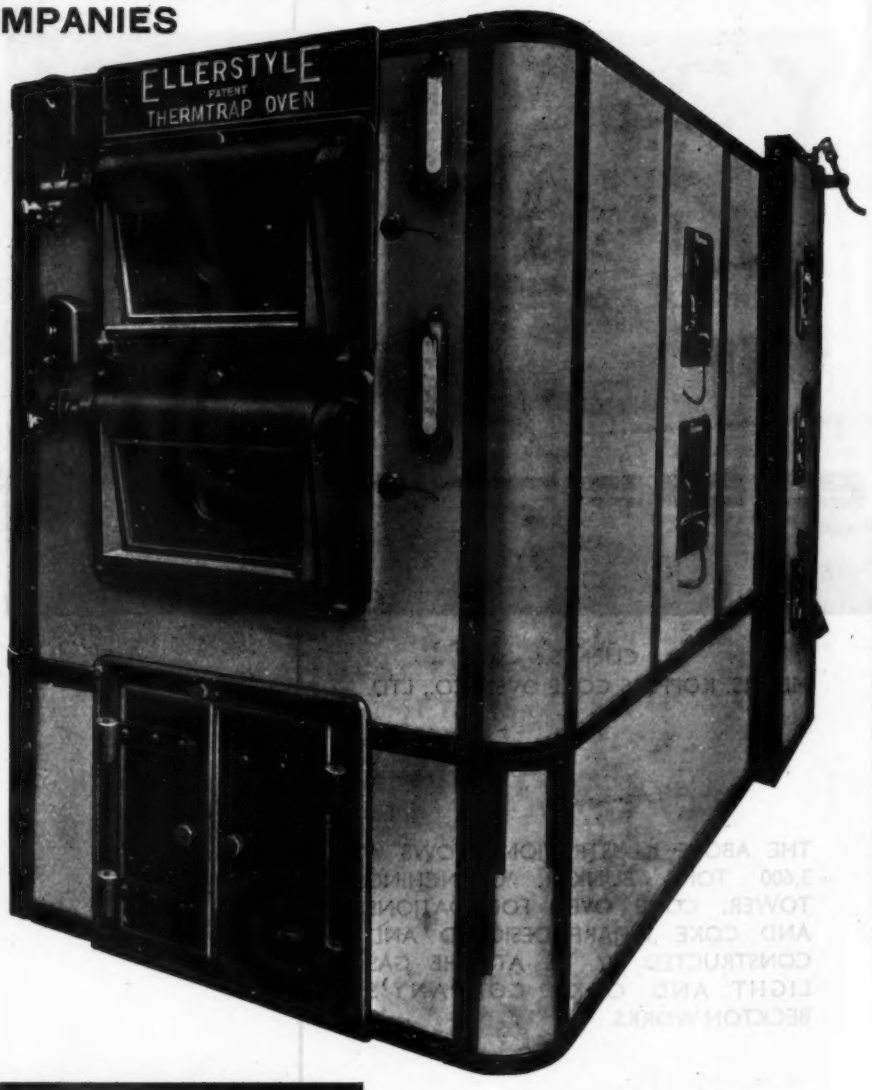
TELEPHONE
WHITEHALL 3746 (4 LINES)

TELEGRAMS
INNELOCLIN, PHONE, LONDON

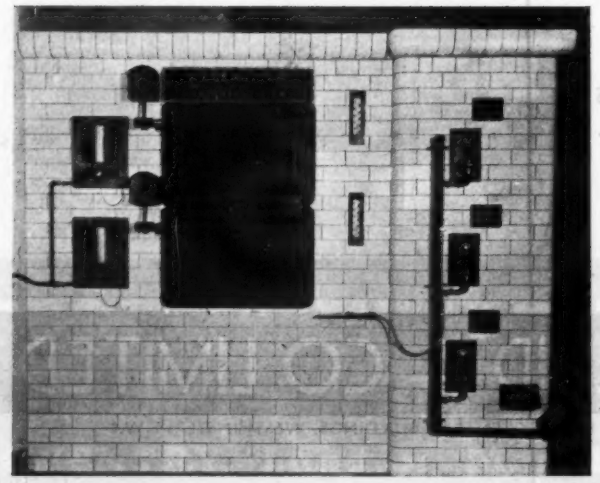
THERMTRAP

(TRADE MARK)

GAS FIRED OVENS ARE ASSETS TO BAKERS & GAS COMPANIES



MADE IN ALL SIZES



DESIGNED & MANUFACTURED BY

ELLERSTYLE ENGINEERING CO. LTD.

JUBILEE WORKS

68 COLEBROOKE ROW LONDON, N.1

'Phones: CLERKENWELL 2157 / 2158

HAWKINS

IMPERISHABLE

IRON CEMENT

For Gas Works repairs, Leaks in Gas Holder Seams, Scrubber Joints, Storage Tanks, Retorts, etc.

Used by over 1,000 of the leading Gas Works for the past 16 years

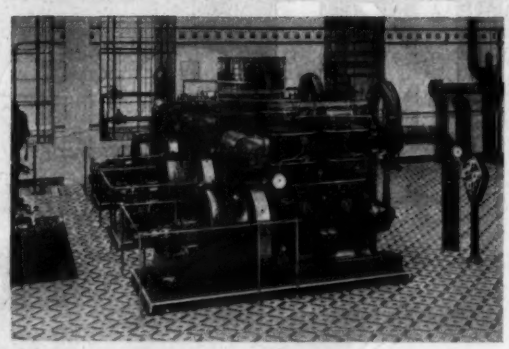
The success of these products has led to numerous imitations. ***See that you get "HAWKINS"***

Sole Manufacturers:

W. T. HAWKINS & CO.,
CHAPEL HILL, HUDDERSFIELD

Manufacturers of HAWKINS IMPERISHABLE JOINTING CEMENT, HAWKITE ROOFING PLASTIC, HAWKITE PAINT, HAWKINS :: :: PLASTIC FIRE CEMENT :: ::

RELIABLE PERFORMANCE



IS THE OUTSTANDING CHARACTERISTIC OF

ASHWORTH & PARKER

PASS-OUT STEAM ENGINES

Their adoption by many of the largest Gas Producing installations in the country for main and auxiliary drives has led to considerable economies and increased efficiency.

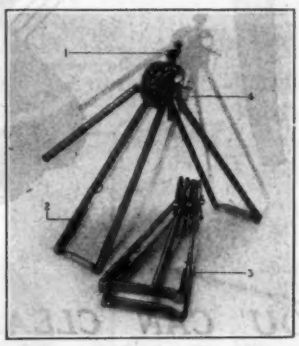
Full information on application to :—

ASHWORTH & PARKER LTD.

Telegrams: "Kinetic" Bury
RIVERSIDE WORKS
BURY, LANCS.
Phone: 620/1

"HILMOR"

DOWNWARDS FOR SHORT ENDS



UPWARDS FOR LONG ENDS

A COMPLETE OUTFIT FOR THE FIXER

FOR THE GAS FITTER (COPPER TUBE SYSTEM)

The G.L.I. Outfit

Patent Nos. 412877 & 194640

THE LATEST PORTABLE TUBE BENDING OUTFIT

Designed Manufactured and Patented by HILMOR LTD. Entirely British

Specially Designed for the most used sizes, i.e., ½" and ¾"

NOTE THESE POINTS

NO Bench required, NO Fixing, NO Loose Parts, Light, Portable, Compact

Will bend Tubes to Any Shape without filling (Two Formers on Centre Pin).
Will bend Any Length of Tube.
Can be Operated in a Small Room, a Corridor or Landing.
Can be Taken to the Actual Spot Where Working.
The Tube Grip (Fig. 1) is Useful for Cutting Off, Filing Ends and for holding the tube whilst heating when Solder Joint Fittings are employed.

Price with Formers and Guides for ½" and ¾" Tube
Complete with Stand and Vice Grip as illustrated **£4 18 6**
When ordering State Bore and Gauge of Tube or O/D Size.

HILMOR LIMITED, 65, SOUTHAMPTON STREET, KING'S CROSS, LONDON, N.1

Telephones: TERMINUS 4714 (2 lines) Telegrams: Tubenders Phone London

Kleenoff

REGISTERED

The Cooker Cleaner

Kleenoff removes ordinary grease almost instantly with ease, and hard-baked grease in an hour or so.

25 years experience goes to the making of every tin and its contents.

10D.

per large tin Retail.

Consistently and Extensively advertised

"YOU CAN CLEAN THE BACK AND CORNERS EASILY WITH KLEENOFF"

Supplied in ½-cwt. Drums and 14-lb. tins extra strong for use in Stove Shops.

NOTE THE NUMBER OF CONSUMERS THAT ASK FOR KLEENOFF

THE KLEENOFF CO. (PROPRIETORS: BALE & CHURCH LTD.) **33, ST. MARY-AT-HILL, LONDON, E.C. 3**

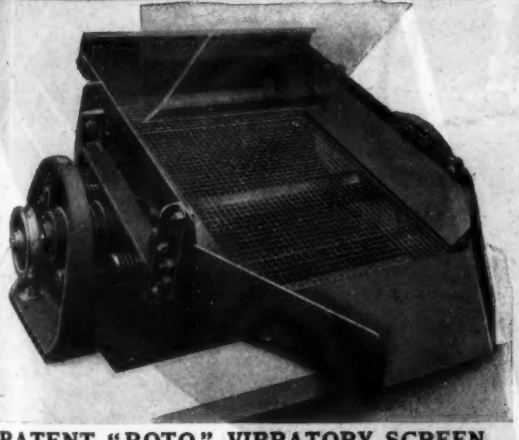
MODERN COKE GRADING

Essential No. 1 for every Coke Grading Plant.*

CORT'S SCREENING CONVEYOR

CAPACITIES, 2 TONS PER HOUR AND UPWARDS.

● *The above illustration depicts a typical installation of our patent screening conveyors distributing into a battery of hoppers at the Hilsea Works of the Portsmouth Gas Company.*



PATENT "ROTO" VIBRATORY SCREEN.
1, 2 or 3 Deck Bulk Handling Types, also De-Breezing Units.

The outstanding proved features include:

1. High Efficiency of the Grading.
2. Non-blinding of Screening Medium.
3. Silent action under load.
4. Elimination of Mechanical Movements.
5. Absence of transmitted vibration.
6. Minimum capital and maintenance costs, etc.

Cort's Screening Conveyors are in operation at, or on order for, the undermentioned Gas Works and other Undertakings:—

Gas, Light & Coke Co.
Fulham (7).
Folkestone.
Portsmouth (8).
Colwyn Bay.
Wisbech.
Sydenham (2).
Berkhampstead.
Guildford.
Hampton Court.
Farnham.
Lichfield.
Horley.
Exmouth (2).
Stretford.
Lincoln.
Mill Hill, etc.

The Coppée Co. (Hardwick Colliery) (2).
Birchenwood Coal & Coke Co., Ltd.
The Egyptian Phosphate Co. (2).
George Cross, Ltd.
Twickenham Gravel Co., Ltd.
Rickmansworth Gravel Co., Ltd.
National Coke & Oil Co., Ltd. (4).
The figures in parentheses show number of units ordered.

ROBT. CORT & SON, Ltd. READING

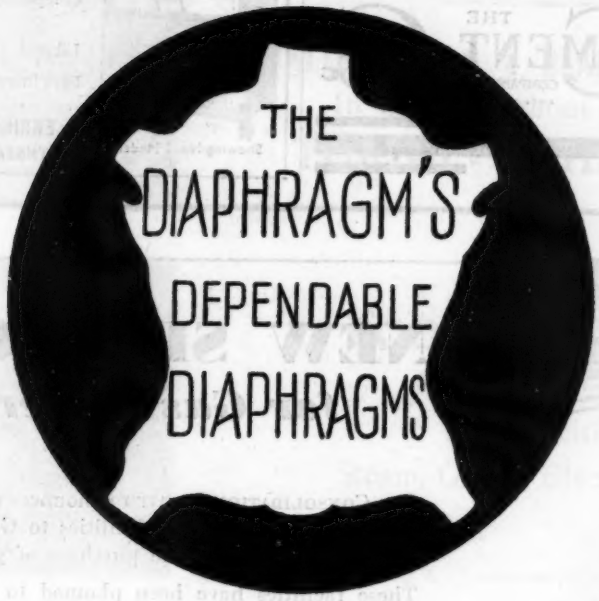
* *For Essential No. 2, see page IV, facing page 565*

INTERMITTENT VERTICAL PLANT BY JENKINS

W. J. JENKINS & Co. Ltd. RETFORD NOTTS

MEMBERS OF THE SOCIETY OF BRITISH GAS INDUSTRIES

ACCURATE REGISTRATION DEMANDS



SINCE 1847
WE HAVE SUPPLIED
THE LEADING METER MAKERS
WITH
METER DIAPHRAGMS

THE DIAPHRAGM & GENERAL LEATHER Co. LTD.
FRANKLIN ROAD WORKS, PORTSLADE, SUSSEX

Managing Director, C. M. W. Turner

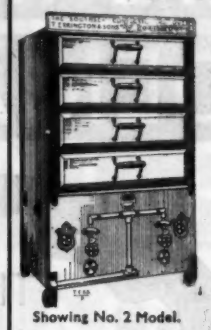
53, VICTORIA ST.

GUNITE ENGINEERS CONTRACTORS

THE CEMENT-GUN COMPANY LIMITED
ESTABLISHED 1924

LONDON, S.W. 1

The SOUTHSEA GAS OVEN
for Hotels, Pie-Makers, Bakers and Confectioners


Showing No. 2 Model.

Strong and Serviceable
Efficient and Economical
Cannot back-fire
All ovens made sectional
Competitive prices, carriage paid
Liberal trade discounts
Free literature

Showing 5150 prov. patent non-back fire gas cock and air regulator fitted to all ovens.

T. ERRINGTON & SONS, Manufacturers,
SOUTHSEA WORKS, PORTSMOUTH

A NEW SERVICE
for Gas Undertakings

GAS CONSOLIDATION LIMITED announces that the Company is now prepared to offer facilities to Gas companies and Gas undertakings for the purchase of gas appliances.

These facilities have been planned to meet the special requirements of the Gas industry, and to provide a convenient means for promoting sales of a wide range of gas appliances on easy terms to gas consumers.

Enquiries are invited from managers and officials of Gas companies on any question of finance, or on any matter connected with plant renewals, extensions or re-equipment.

GAS CONSOLIDATION LTD.
15, Moorgate, London, E.C.2

Issued Capital £500,000

Telephone: Metropolitan 3622 Telegrams: Gasolidate, Stock, London

JOSEPH EVANS & SONS, (WOLVERHAMPTON) LTD.
CULWELL WORKS, WOLVERHAMPTON.

Telegrams: "EVANS, WOLVERHAMPTON."
National Telephone Nos. 20864 and 20865.

London Address: 109, Kingsway, W.C.2
Telephone: HOLBORN 1091.
Telegrams: "DEVOSBO, WESTCENT, LONDON."

TRADE MARK. Please apply for Catalogue No. 8.

Fig. 705. "SINGLE RAM" STEAM-PUMP.

Fig. 598. "CORNISH" STEAM-PUMP FOR BOILER FEEDING, &c.

Fig. 685. "RELIABLE" STEAM-PUMP FOR TAR AND THICK FLUIDS.

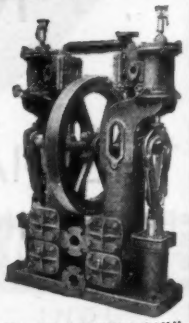
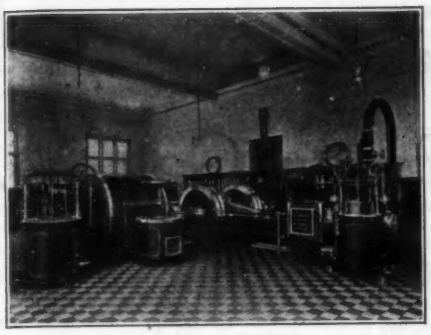


Fig. 712. "DOUBLE-RAM" STEAM-PUMP.

A WORLD-WIDE REPUTATION

FOR

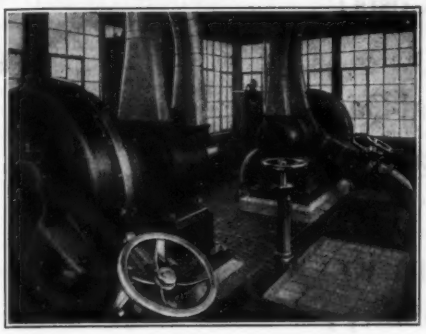
RELIABILITY



WALLER'S 3 & 4 BLADE EXHAUSTERS

In use throughout the World.

TURBO - EXHAUSTERS

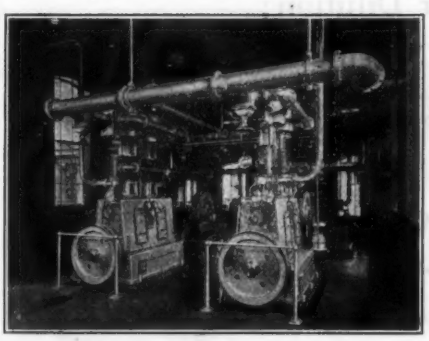


BOOSTING FANS

for light pressures.

All capacities.

Steam, Gas or Electric drives.



GAS COMPRESSORS

for pressures up to 100 lbs. per sq. inch.

Vertical Enclosed Type.

Horizontal Type.

"Michell Crankless" Type.

PAN ASH SEPARATORS

"Retriever" Patents.

A Paying Proposition.

Over 100 Installations supplied.

WRITE FOR OUR CATALOGUES

Members of the Society of British Gas Industries

Telegrams
WALLER,
BRIMSCOMBE

GEO. WALLER & SON, Ltd.,

PHOENIX IRON WORKS, STROUD, GLOS.

Telephone:
BRIMSCOMBE
10

Humphreys & Glasgow Ltd.

Collateral Advantages
of
Carburetted-Water-Gas
as a
Coal-Gas Auxiliary

Low Manufacturing Costs;
Low Capital Charges;
Saving in Cost of Coal-Gas;
Saving in Ground Space;
Saving in Wear and Tear;
Saving in Storage Capacity;
Availability and Flexibility;
Cheap Enrichment or Dilution;
Instant Control of Calorific Value;
Increased Prices for Coke;
Decreased Prices for Gas-Coal;
Independence of Labour;
Independence of Gas-Coal;
Less Naphthalene Troubles;
Higher Flame Temperatures;
Improved Combustion;
Purer Combustion Products—

leading to

Amazing Saving in "Peak-Load" Service

for both

Quantity and Quality

and resulting in

Cheaper and Better Town-Gas

Humglas House,
Carlisle Place, London, S.W.1.

CONTENTS

EDITORIAL NOTES.

The Small Undertaking 519
Upwardly Heated Verticals 519
Coal Industry Reorganization 520
The Housing Bill 520
Compensation of Public Utilities 521
The B.I.F. 521

Personal 522
Obituary—
Death and Funeral of Mr. Frederick McLeod 522
News in Brief 523
Forthcoming Engagements 523
A New Use for Gas 524
Loyal Address to H.M. The King 525
Amalgamation and Grouping—
Severn Valley and Newport (Mon.). . . 525
Acceptance for The Institution Meeting . . 525
Society of British Gas Industries—French Quota for U.K. Glassware 525
"Proprietors' Day" at the Croydon Works—Plant Inspected by 700 Visitors 525
Richmonds "Bungalow" New World Cooker 525
Recent Orders for Woodall-Duckham Continuous Vertical Retorts 525

National Gas Council—Meeting of the Executive Board for Scotland 526
The British Gas Federation Visit the Fair . 527
The Prince at the B.I.F. 528
The Whessoe Foundry and Engineering Company—Some Recent Orders 528
A New Tube Bending Machine 528

ANNUAL MEETING OF THE I.G.E.

Gas Floodlighting of St. James' Park—Special Extension for the Institution . 530

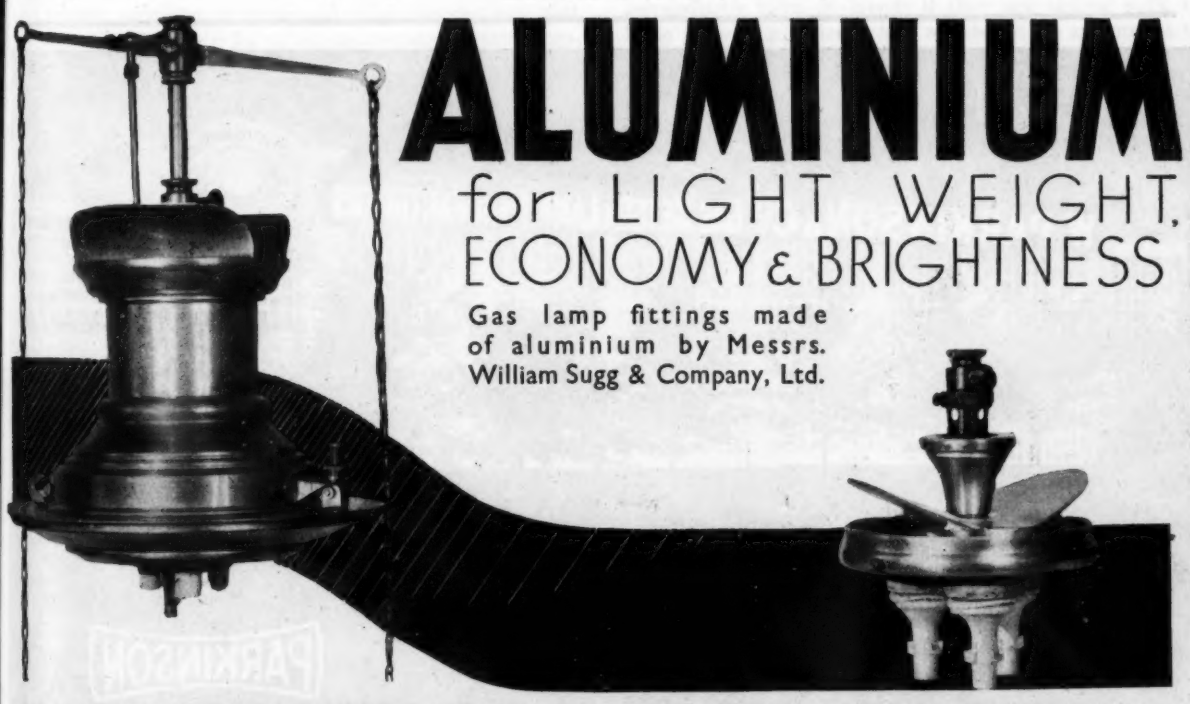
COMMUNICATIONS.

National Policies Governing the Testing of Gas Appliances. By Stephen Lacey, B.Sc., M.Inst.C.E., and C. A. Masterman, M.A., F.I.C. 531
Problems and Answers in the Reconstruction of Manufacturing and Distribution Plant at Nottingham. By George Dixon, B.Eng., Assoc.M.Inst.C.E. 538
The Gas Account. By W. B. McLusky . 548
Policy and Performance in the Development of Gas Sales. By Samuel B. Chandler . 554
Waste Heat Recovery from Retort Settings. By Major W. Gregson, M.Sc., M.Inst.C.E., M.I.Mech.E. 561
The Preparation, Marketing, and Utilization of Coke. By W. L. Boon. M.I.Mech.E. . 568

Wales and Monmouthshire Association of Gas Engineers and Managers—
Annual Meeting at Llanelly 578
Presidential Address of Harold Barker . 578
Golf Competition 580
Scottish Junior Gas Association (Eastern District)—Annual General Meeting 580
Fine New Works for Ascot Gas Water Heaters, Ltd. 581
Gas Heating in the Food Industry. By Peter Lloyd, B.A., A.I.C. 583
Primitiva Holdings, Ltd. 584
Legal Intelligence—
Alleged Negligence at Wandsworth . . . 585
Gas Undertakings' Results 585
Gas Markets and Manufactures—
Stock Market Report 586
Current Sales of Gas Products 586
Contracts Advertised To-Day 586
Trade Notes 586

Stock and Share List 587

For Advertisers' Index see End of "JOURNAL"—PAGE 593.



ALUMINIUM
for LIGHT WEIGHT, ECONOMY & BRIGHTNESS
Gas lamp fittings made of aluminium by Messrs. William Sugg & Company, Ltd.

The BRITISH ALUMINIUM Co., Ltd.
Head Office: ADELAIDE HOUSE, KING WILLIAM STREET, LONDON, E.C.4
Telephone: MANSION HOUSE 5561 & 8074 (5 LINES). Telegrams: CRYOLITE, BILGATE, LONDON

LONDON WAREHOUSE: 25-29 Pancras Road, N.W.1.
BIRMINGHAM 4: Lawley Street.
MANCHESTER: 274 Deansgate.
LEEDS, 3: 66 Kirkstall Road.
NEWCASTLE-ON-TYNE, 1: Milburn House.
GLASGOW, C.2: 113, West Regent Street.
G.J. 29.5.35.

MODERN METER MAKING

Tool making of the highest class

Thomas Glover & Co., Ltd. - - - - - - - - - Edmonton, London, N. 18, & Branches

LONDON
COTTAGE LANE
CITY ROAD

BIRMINGHAM
IRON LANE
STECHFORD

BELFAST
RAPHAEL STREET
CROMAC STREET

Gas Journal

MAY 29, 1935

Vol. 210. 87th Year No. 3758.

Editorial Notes

The Small Undertaking

WITHIN a fortnight we have been able to publish in the "JOURNAL" two Presidential Addresses to Senior Associations, and both by men in charge of the small undertaking. On May 15 appeared the Address of Mr. Clarke, of Stamford, to the Eastern Counties Gas Managers' Association, while on later pages to-day will be found the Address of Mr. Barker, of Llanelly, to the Wales and Monmouthshire Association. We welcome the recognition by the members of these and other Associations that efficiency in working is by no means necessarily the prerogative of the large underaking—that many of the smaller works are manufacturing a good therm cheaply, are distributing it in a manner fully adequate to the needs of the consumer, and are doing all possible to give good service. On many occasions we have emphasized that those in control of the smaller undertakings have the great advantage of personal contact with their consumers. Mr. Clarke showed that he is fully alive to this fact, and the same idea, we are glad to note, is stressed by Mr. Barker in our columns to-day, for we are not of those who consider that the efficiency of a business concern is directly proportional to its size. There is no reason why the small undertaking should be a weak link in the service gas can offer, and we say this while granting that many and obvious advantages can accrue by wise amalgamation. There are undertakings in this country which are both small and isolated, but, in the light of the two Addresses to which we refer, there is no reason why such small undertakings should not, in relation to the circumstances of supply, uphold worthily and effectively the service motto of our Industry. At any rate, where inefficiency exists on the works the size of the unit ought not to be blamed, for a large gas-works is, after all, a collection of small ones; the managers of the smaller undertakings have no need to lose heart.

Mr. Barker comments on the dwindling consumption per meter and gives some of the causes for this. Under the title "Remedying the Decline" we discussed this matter at some length in these columns last week in relation to Sir David Milne-Watson's Address to the National Gas Council. The adoption of tariffs other than the flat rate is one method of increasing consumption per consumer, and we are surprised that Mr. Barker makes no mention of this all-important topic—as important to the small undertaking as to the large one. Another method of increasing the sales per meter is attention to the large-scale loads which commerce and industry offer. The need for such attention is, very rightly, brought out by Mr. Barker, and we are glad that he speaks of the greater freedom which all gas undertakings now enjoy under the new legislation. All gas undertakings in the country can now make special contracts to supply gas on such terms as they think fit, without fear of committing any breach of maximum price provisions and without jeopardizing their dividends if they are sliding scale or basic price companies. And we should be astonished to discover any gas undertaking in whose area of supply there is not a chance of negotiating a "special contract."

Upwardly Heated Verticals

THE part which personal contact with the consumer can play in increasing gas sales was also brought to the fore by Mr. Davies in his Paper to the Wales and Monmouthshire Association last week, which will be published later. Mr. Davies dealt with continuous vertical retorts for small undertakings, with special reference to his five years' experience of Woodall-Duckham upwardly heated continuous verticals at Tredegar, where he combines the many tasks of Engineer and Manager of the Gas, Water, and Electricity Department. The installation at Tredegar was the first of its kind to be erected in Great Britain, and consequently what Mr. Davies has to say about the success of this departure from the then standard practice must carry more than ordinary weight.

Among the claims made for the upward heating system are the minimizing of erosion and spalling of the refractories, improved ease of coal travel, reduction of scurf formation, and, due to the peculiar zoning of heats, a better gaseous thermal yield per ton of coal put through the retort. In regard to the first—and this seems to us of great importance—Mr. Davies explains that after five years' working at Tredegar "no serious spalling has occurred and the only repairs that have been necessary to the retort brickwork have been the pointing of two retorts and the patching of a few courses in the lower portions of the silica zones in these retorts." Now, while bearing in mind the type of coal the author is treating, this is remarkably good testimony. As for the second advantage claimed, ease of travel of coal, Mr. Davies

simply states that he has experienced little or no difficulty; but in this regard the coal used at Tredegar does not test the claim properly. Loss of time for scurfing is "very small indeed. Retorts can go on for a very long period before having to go off for scurfing; indeed, it is on record that one retort after working for eighty-two days was put off gas making owing to make being in excess of demand. When emptied and examined, this retort showed only a very thin layer of scurf."

And now for make per ton. Mr. Davies is making 77 therms of 450 B.Th.U. gas, which on the face of it is a very low yield. But, as we have emphasized, he is treating a coal which is most unusual in gas-works practice. Actually it is a steam coal containing only 19% of volatile matter, and, of course, while losing on his tar, he gains in the amount of coke for sale, his figure for coke and breeze being 12 cwt. per ton of coal (73% fixed carbon) treated. Any analysis of the results at Tredegar must therefore be made bearing in mind that a steam coal is being employed. The Paper would, in fact, have been more generally useful if gas coal had been carbonized in the plant. As it is, however, the Paper is decidedly helpful, particularly to the smaller undertakings. One very significant fact should be stressed. Small underings and high gas charges sometimes go together. Tredegar is selling gas at the comparatively low price of 8·55d. a therm. There is scope here for a tariff other than the flat rate.

To return for a moment to the question of personal contact with the consumer and general concentration on the sales side, which is the dominant theme of this note, we quote the following from Mr. Davies' Paper: "It is becoming more and more obvious that if the Gas Industry is to hold its own, the more time the man in charge of the medium sized undertaking can devote to management in the commercial and financial sense, the better for his trading prospects. Accordingly, the plant which can give efficient results without demanding too much of his time will ultimately redound most to the overall efficiency of his undertaking." Mr. Davies leaves no one in doubt as to the type of plant which, in his opinion, can effect this most desirable end.

Coal Industry Reorganization

On Thursday last the Court of Railway and Canal Commission refused to confirm a scheme for partial amalgamation of coal mines in West Yorkshire.

The scheme was one which was put forward by the Coal Mines Reorganization Commission, a Commission constituted by Part II. of the Coal Mines Act, 1930, to prepare schemes of amalgamation of coal undertakings where such amalgamations appeared to the Commission to be in the national interest.

The scheme submitted did not involve the financial fusion of the various coal mines within the district, but did contain machinery for the joint exercise by the coal owners of the district of certain powers respecting the working and disposal of coal produced in the district.

The actual details of the scheme, in so far as it related solely to the internal reorganization of the coal industry in West Yorkshire, do not directly concern the Gas Industry. It may, however, be of interest to state that the Court held the scheme was not a partial amalgamation within the meaning of the Coal Mines Acts and that it did not fulfil the requirements of those Acts—*i.e.*, that it should be in the national interest; result in the lowering of the costs of production or disposal of coal; and be fair and equitable to all persons affected.

The effect which such a scheme if enforced might have upon the Public Utility Undertakers of the country was clearly indicated in the evidence of Mr. A. W. Archer, the Vice-Chairman of the West Yorkshire Coalowners Association. As reported in the *Daily Telegraph*, Mr. Archer said: "I consider that the price for coal charged to the householder is much too high and I am wholly in favour of a price reduction. But the prices charged to gas and public utility works are substantially too low. If we have a scheme of this kind and it were extended to other districts, in my judgment there would be an entire revision of coal prices in this country. You cannot reduce the price of house coal so long as you continue to supply these prosperous undertakings with coal at less than the price of production."

It is to be remembered that the West Yorkshire scheme was a test scheme, and if it had been confirmed by the Court would undoubtedly have been extended to all other coal mining districts. The result would have been that through the medium of schemes of so-called amalgamation price rings would have been formed and established against gas undertakings. The Industry is sufficiently hampered by Central District Schemes made under Part I. of the Act and operated by the Board of Coalowners. Such schemes, detrimental as we believe them to be, are at least subject to some Ministerial supervision, and those affected thereby have the somewhat nebulous right of appeal to the Committee of Investigation of the District. The effect of the so-called amalgamation scheme, if confirmed, would have been largely to over-ride the price regulating provisions of Part I. of the Act, and to place the Gas Industry at the mercy of an unknown person, compared by Mr. Justice Mackinnon to a benevolent dictator elected by the coalowners.

It is far from surprising that the Court held that such a scheme was not in the national interest; and it is particularly gratifying to learn that the Court did not consider it was within the province of an amalgamation scheme made under Part II. of the Act to deal with the question of price regulation.

The Housing Bill

The interesting debate upon the effect of the Housing Bill upon Public Utility Undertakers which took place in the House of Commons on May 16 was not entirely satisfactory in its results. It was nevertheless gratifying in this respect, that it indicates the increasing importance which members of all parties attach to the interests of Public Utility Undertakers. This is in no small measure due to the work of the Conjoint Conference of Public Utility Associations, which enables the great industries of gas, electricity, and water to speak with one voice on all the many matters in which their interests are similar.

The question of housing in its relation to the Public Utility Industries of the country has not always received the attention which its importance merits. When the earliest Housing Acts were passed some half-a-century ago, the serious loss which might result to undertakers by reason of the Acts was largely overlooked, owing doubtless to the fact that no national organizations existed which were able adequately to place their interests before the Government of the day.

Since those days slum clearance and rehousing schemes have assumed dimensions little dreamed of by our fathers, and the nation has just grounds for congratulation on the progress which has been made. To-day housing schemes may involve the total demolition of all buildings in large areas, the obliteration of streets, and even, as recently at Yarmouth, the transference of a large portion of the population to a district outside the area of undertakers by whom they were formerly served.

It is hardly necessary to emphasize the serious financial loss which operations of such magnitude must involve —the capital represented by mains in streets and apparatus in premises becomes obsolete, and the consumers,

formerly, from the point of view of health, all too numerous, become non-existent. Should such a loss fairly be left to fall upon the shareholders and remaining consumers of the undertaking?

The answer, which is quite superficial, is that in all reorganizations and reforms someone must bear the loss, and that the general policy of the Acts is that persons who are in any way, either actual or fictitious, responsible for the existence of slums cannot expect compensation for their demolition. The application of such an argument to Public Utilities was wholly rejected by the House of Commons—as indeed it must be rejected by the general public. So far from being in any way responsible for slums, it is the Public Utilities alone who have made life in slums endurable, and who have by the supply of gas, electricity, and water made available the most essential amenities of modern life to the poorest classes of the community. Further, Parliament has placed upon such undertakers as are statutory an obligation to give and maintain a supply of their commodity alike to peer and peasant. Can it be agreed, therefore, that gas, water, and electricity companies should be financially penalized because they have faithfully carried out the duty imposed upon them by Parliament?

Compensation of Public Utilities

It is satisfactory to know that the Government, by their attitude during the passage of the present Bill through the Commons, have indicated that they accept, in part at least, the views we have expressed. Of course, they are faced, as all Governments are faced, with the not too simple problem of deciding where the money is to come from. Thus, while not going the length of conceding all that might, in our view, reasonably have been granted, they have at any rate accepted the principle that the Public Utility Industries cannot be overlooked.

During the Committee stage of the Bill a considerable number of amendments were put down on behalf of Public Utility Undertakers, and in the majority of cases the principle involved in such amendments was accepted by the Government. One of the most important of such amendments was that which provided that before any rehousing scheme is undertaken due notice must be given to the Public Utilities affected, whether they may be statutory or non-statutory. The acceptance of this amendment is an admission by the Government of the fact, which some Local Authorities have denied, that Public Utilities are vitally interested in housing schemes and are thus entitled to due notice that such schemes are to be put forward.

The most vital matter, however, is that which relates to compensation. Under the existing law, it is doubtful whether any compensation could in practice be obtained from a Housing Authority by Public Utility Undertakers. It was this important and difficult question which was debated in the House when the Bill was reconsidered after the Committee stage. It was ably argued by Mr. Herbert Williams and Mr. Horobin that adequate compensation must include recompense in respect of the following:—

1. The removal of mains, cables, and pipes from streets, when such removal becomes in the opinion of the Public Utility reasonably necessary owing to the operation of housing schemes under the Housing Act, 1930, or the present Bill.
2. The loss of appliances and apparatus belonging to undertakers upon premises to be demolished.
3. The loss of business where consumers are removed outside the limits of supply.

Although great pressure was placed upon them, the Government refused to accept the principle of compensation for loss of business or for appliances and apparatus inside premises. A clause granting compensation in respect of mains, cables, and pipes in streets, however, was accepted and incorporated in the Bill. Although some disappointment is natural, it is satisfactory to know that the position of Public Utility Undertakers under the new Bill will be considerably more satisfactory than at present. Having regard to the well-nigh almighty power which the Government can wield by means of the party machine, we think that an impartial view of the whole proceedings will afford considerable satisfaction to the Industry.

The B.I.F.

One of the events of last week was the expedition, in force, of the British Gas Federation to Castle Bromwich, when about 250 members accepted the invitation of the Authorities to visit the heavy section of the British Industries Fair. This was the first occasion on which the Federation had functioned outside London, and, in the very well known circumstances connected with the absence from the Fair of an official Gas Section, it was extremely appropriate that the new Federation was available to represent the Gas Industry if not " with one voice " at least with one pair of eyes and one pair of ears.

With the ears they were able to hear charming words of welcome at the luncheon provided by the customary hospitality of the Fair Management, and an obviously genuine expression of regret that the Gas Industry had not found it possible to exhibit in bulk this year. The expression was tempered, however, with a clear appreciation of the reasons which had brought about this absence, and we have heard nothing but admiration for the way in which the " defaulters " were received.

With the eyes which the Federation carried for it, the Gas Industry was able to see a very fine show indeed. There were no two views about this, and it is idle to pretend that no regrets were expressed among the party at the Industry's absence as an industry—that there was no feeling of positive missing after its long association with Castle Bromwich. This, we suggest, was quite natural; nobody feels particularly happy as a spectator at a show of any kind in which he has once played a leading part. Unfortunately, however, participation in exhibitions entails considerable outlay and, bearing this in mind, perhaps any disappointment which was felt actually on the spot may have been tempered—for those who felt it—by after thoughts.

It was undoubtedly galling at the time to see there a fine collective exhibit by a competitive industry, but before throwing up our hands in dismay let us ask ourselves who else was looking at it besides ourselves, and in general whether the " audiences " at Castle Bromwich are really of the kind which is essential to our general welfare. Let us think whether, in fact, any exhibition effort on behalf of national gas consumption can attract a worth-while crowd without packing consumers into trains and other vehicles and actually taking them there from all over the country. And then, if we answer these questions for ourselves in the negative, we are faced with the still more difficult problem of assessing the actual value of prestige gained or lost by participation or non-participation.

For our part we are pleased to be able to regard the whole question of exhibitions as *sub judice* of the B.G.F. Committee, and so avoid any detailed discussion of the knotty points to which we have referred, and many others which can be put up on this very complex subject. But how truly impish of our weather to provide such a May day for the official gas visit this year! We well remember discussing the temperature aspect of B.I.F. exhibiting just a year ago in sweltering heat which seemed to provide an unanswerable argument against participation by the Gas Industry.

PERSONAL

In consequence of Mr. W. A. Blackwell, of Mansfield, having declined the offer of the Secretaryship of Berwick and Tweedmouth Gaslight Company, Ltd., the Directors have appointed Mr. ISAAC M. HARDACRE, of Harrogate, to fill the office. Mr. Hardacre has been in the service of the Harrogate Gas Company for many years, and latterly was Assistant Secretary of that Company.

* * *

Mr. JAMES BIRKETT, who has retired from the position of Chief Clerk of the Carlisle Gas Department after 40 years' service, recently received from the Committee a framed resolution of thanks signed by the Mayor, the Town Clerk, and the Engineer and Manager, Mr. J. E. Blundell. From his fellow-employees he was the recipient of a gold hunter watch and an umbrella for Mrs. Birkett.

* * *

Mr. R. A. MOTT, M.Sc., F.I.C., of the Fuel Department of Sheffield University, and who is in charge of the staff of the Midland Coke Research Committee, has been awarded the degree of Doctor of Science of Leeds University.

Mr. OWEN EVANS, Engineer and Manager of the Wrexham Gas Company, has been elected President of the Wrexham Rotary Club.

* * *

Councillor ALBERT HODGEN, J.P., has been unanimously re-elected Chairman of the Belfast Gas Committee and Councillor ROBERT J. GROVES Vice-Chairman.

* * *

Congratulations and all good wishes to Mr. and Mrs. REX CHESTER upon the birth of a son, on May 25, at Pantiles, Southsea.

* * *

Their friends in the Gas Industry will be interested to know that the following are at present in this country on furlough: Mr. R. C. EVANS, Secretary, Metropolitan Gas Company of Melbourne, Vic.; Mr. HAROLD E. STONE, General Manager, Hong Kong and China Gas Company; and Mr. H. WOOD, Works Engineer, Sydney, N.S.W.

OBITUARY

Mr. Frederick McLeod.

Mr. Frederick McLeod, a Director and former Secretary and General Manager of the South Metropolitan Gas Company, and since 1930 a Director of the Commercial Gas Company, died at his home in Caterham after a short illness on May 21 at the age of 76.

Even in an Industry where long service is taken for granted, Mr. McLeod's sixty years of active association with the South Metropolitan Gas Company stand as a record permitted to few. He began as a boy in his 'teens—his father also served the Company, and his son now serves it as one of its Distribution Engineers—and soon attracted attention as one marked out for greater things. After learning the practical work of the district, he was transferred to the administrative office, and eventually attained the rank of Chief Inspector, with responsibility for all contacts with consumers.

On the retirement in 1908 of Mr. Frank Bush, who is still a member of the Board, Mr. McLeod was appointed Secretary; and in that post he remained during the anxious days of the war—when the demand for munitions put a heavy strain on the resources of gas undertakings—and during the no less trying time that succeeded it. They were important years for the Gas Industry, culminating in the legislation of 1920 and the change to the thermal basis of charge in which the South Metropolitan Company was the pioneer. Towards the end of 1921 Mr. McLeod became General Manager, and in 1927, after 52 years' service, he retired from the staff to take a seat on the Board.

Many men have the gift of industry and application, but Mr. McLeod had other deeper qualities as well which fitted him for dealing with some 9,000 employees and the public bodies of the area. A master of detail, his opinions were not lightly formed, but when once formed they were fearlessly pursued; and he was known to be just. The traditions of an old-established undertaking were something very real to him, and he took intense pride in seeing that they were continued on the right lines. He entered as wholeheartedly into the social activities of the employees as into their work, and his reward came in a complete trust and affection, even when opinions differed. Mr. McLeod's appointment as a Justice of the Peace for the County of London gave him particular pleasure, and his colleagues on the Bench, as well as on the Board, will sadly miss his shrewd and sympathetic judgment.

Several hundred people attended the funeral at Norwood Cemetery on May 24. The burial service was conducted by the Rev. Herbert Kennard, Commissioner for the Congregational Church Extension, and the family mourners were Mr. Leonard McLeod (son), Mr. Edward McLeod and Mr. Henry McLeod (brothers), Mr. and Mrs. Frederick Wollen, Mr. Douglas McLeod and Miss Norah McLeod (nephews and nieces), Mr. F. Saunders, Mrs. N. McLeod and Mr. and Mrs. C. W. Rowe (brothers-in-law and sister-in-law), Mr. J. C. Graeme, Mr. Herbert Bridge, and Mr. Stanley Ford.

Among others in the assembly, which included members of the staff and employees from all branches of the South Metropolitan Gas Company, were Dr. Charles Carpenter (President), Mr. Frank H. Jones (Vice-President and representing Mr. Arthur Paddon, a Director), Messrs. B. R. Green, H. Gundry, S. H. Jones, H. Putt, J. B. C. Pinks, and V. Hewes (Directors), Mr. E. V. Evans and Mr. A. H. Andrews (Joint Managers), Mr. F. G. Brewer (Secretary), Mr. A. S. Holden (Assistant Secretary), Mr. R. N. Barnett (Chief Accountant), Mr. Albert Stokes (formerly Joint Manager), Mr. F. J. Bywater (Coal and Shipping Department, Newcastle), Messrs. H. M. Browne, A. R. Torry, H. E. Morgan, A. S. Stevens, E. S. Stredwick (Local Managers), Mr. T. Brown (Secretary, South Suburban Gas Company), Mr. F. J. Bradfield and Mr. A. E. Williams (General Manager and Secretary, and Chief Engineer respectively of the Commercial Gas Company), Mr. P. E. Browne (Brighton Gas Company), Mr. C. M. Croft (General Manager, Wandsworth and District Gas Company), Mr. W. L. Galbraith (Secretary, Gas Light and Coke Company, and representing Sir David Milne-Watson), Mr. A. B. Pasmore, Mr. R. Delf, representing Mr. G. T. Whiteley (Clerk of the Newington Sessions where Mr. McLeod sat as a Justice), Mr. Evan Cook, J.P., Alderman F. Whitehead, Mr. George Fry (Midland Bank), Mr. G. W. Grace (Lion Cartage Company), Mr. Louis Bertolle (G. Howlett & Sons), and Mr. W. A. Phillips (Bermondsey and Rotherhithe Ratepayers' Association).

Many beautiful floral tributes were sent by the widow and son and other members of the family, personal and business friends, the Directors and various branches of the South Metropolitan Gas Company, the Caterham Congregational Church, and numerous associations with which the late Mr. McLeod was connected.

* * *

We regret to announce the sudden death at Brussels, on May 10, of M. MAURICE PERIER.

M. Périer entered the service of the Imperial Continental Gas Association in 1910 as Assistant Engineer and, on completion of his War service, was appointed Assistant Manager to the late M. H. de le Paulle, whom he succeeded in 1931. At the time of his death, M. Périer was a Director of most of the undertakings in which the Imperial Continental Gas Association is interested in Belgium, including the Antwerpsche Gasmaatschappij; Comptoir Brabançon des Cokes; Les Cokeries du Brabant; Compagnie Belge et Continentale de Gaz et d'Electricité; Compagnie Continentale d'Appareils de Mesure; Société de Distribution du Gaz; Association Intercommunale pour la Distribution de l'Energie Electrique; Société d'Electricité et de Gaz de l'Agglomération Bruxelloise; Union Intercommunale des Centrales Electriques du Brabant; Association Intercommunale pour la Distribution du Gaz; Matériel et Appareillage pour le Gaz, l'Electricité, et le Coke; Compagnie Nationale d'Eclairage; and the Société Provinciale du Gaz et de l'Electricité.

M. Périer was a very respected figure in the public life of Brussels, and his services to his country were recognized by his promotion to the rank of Chevalier de l'Ordre de Léopold. He brought not only high ability, great tact, and unlimited enthusiasm to the discharge of his duties, but also great personal charm of manner, and his untimely death at the early age of 51 leaves a gap difficult to fill.

News in Brief

An Increase of 2,215,500 cu.ft. in the output of gas for the year to April 30 is reported by the Ardrossan Corporation Gas Department.

The Broxburn Gas Company has been registered as a public company, with a capital of £25,000 in £1 shares, to carry on the business of a gas undertaking in all its branches.

For Industrial Heating a commodity charge of 3d. per therm net, *plus* a service charge, dependent on particular circumstances, will in future be made by the Accrington District Gas and Water Board.

Thanks were Extended by the Great Harwood District Council to Mr. A. J. Harrison, Engineer and Manager of the Accrington District Gas and Water Board for floodlighting public buildings during the Jubilee celebrations.

Demonstrations of Gas Appliances and lectures in cookery, arranged by the Stafford Gas Department, were given at the Borough Hall last week and were well attended. The Mayor (Alderman F. W. Pitt) opened the exhibition.

The Belfast Association of Engineers who paid a visit of inspection to Belfast Corporation Gas-Works were conducted round by Mr, J. D. Smith, J.P., M.Inst.C.E., Engineer, Manager, and Secretary, and Mr. J. L. Hyslop, Assistant Engineer.

During the Jubilee Celebrations the Arbroath Gas Department floodlighted to excellent effect the local Water Tower. At Chichester the floodlighting of the local Council Chambers was carried out very successfully by the City of Chichester Gas Company.

An Increased Dividend of 5% is being paid by the Antwerp Gas Company, Belgium, instead of 4¾%. The Company report a net profit, at the new Belgian franc parity rate of 143¼ to the £, of £117,366 for last year as compared with £107,578 in 1933.

The Offer of the Thornton Cleveleys Council as compensation for the transfer of rights to supply gas within the area of the former parish of Carleton, now forming part of the Thornton Cleveleys urban district, has been accepted by the Poulton Council.

The Scottish Branch of the National Smoke Abatement Society was addressed at their recent annual meeting at Stirling by Mr. George Braidwood, Engineer and Manager of the Coatbridge Gas Company, on "Gas Grids and Smoke Abatement Possibilities."

Application for a Special Order under the Gas Undertakings Acts, 1920 to 1934, is to be made by the Bath Gas Company to the Board of Trade with the objects *inter alia* of purchasing the Melksham Gas Light and Coke Company and of extending their limits of supply.

Under the Auspices of Dunoon Town Council Gas Committee a four days' exhibition of appliances was opened on May 21 by Councillor Mactavish, Convener of the Committee. Cookery demonstrations were given by Miss A. A. Andrew, and the exhibition attracted large audiences.

The Assessment of the Accrington District Gas and Water Board's properties and the new and suggested assessments in the 1934 list received consideration on May 23, and in view of the large increases shown, it was decided that the opinion of a rating expert be obtained.

New Capital Issue.—As will be seen from our advertisement pages, Messrs. A. & W. Richards, 37, Walbrook, E.C. 4, are offering for sale by tender on behalf of the Directors of the Lowestoft Water and Gas Company, £35,000 4% preference stock at par. Tenders will not be accepted after noon on Friday, June 14, 1935.

Edinburgh Jubilee Postcards.—Mr. James Jamieson, Engineer and Manager of the Edinburgh Gas Department, has kindly sent us copies of the postcards that the Department are distributing to the boys and girls in Donaldson's Hospital School, Edinburgh, showing the school floodlighted by gas on the occasion of the Jubilee celebrations.

The Second Largest Battery of Coke Ovens in Europe will, we understand, be erected by Simon-Carves, Ltd., for Dorman Long & Co., the iron and steel firm, of Middlesbrough, at their Cleveland Works. It is estimated that the total cost of the plant will be in the region of £2,000,000, and that the extension will be the biggest in the iron and steel industry on Tees-side for many years.

The Next Meeting of the Coke Salesmen's Circle has been arranged for Wednesday, June 12, commencing at 2.30 p.m. in the Conference Room, 28, Grosvenor Gardens, S.W. 1, when a Paper on Central Heating with Particular Application to Houses having two or three Radiators will be read by Mr. L. J. Fowler, of the London and Counties Coke Association.

We have Received from the British Engineers' Association a copy of the B.E.A. Classified Handbook of Members and their Manufactures (1935 Edition). Copies of this useful publication will be posted free of charge to anybody interested in the purchase of British engineering plant, machinery, or accessories, on application being made to the Secretary of the Association.

Bethesda Loan Application.—A special meeting of Bethesda Urban Council was held last week to consider a letter received from the Ministry of Health in connection with the Council's recent application for sanction to float a loan for carrying out repairs to their Gas Undertaking. The letter invited the Council to meet the Ministry in London to lay their case before them.

Bottled Gas in France.—Two new bodies have recently been organized in France to encourage the use of compressed gas for the running of the engines of motor vehicles and for other purposes—viz., Le Comité pour le Développement de l'Emploi des Gaz Comprimés, which will look after the technical side of the movement, and the Société Française pour l'Exploitation des Gaz Comprimés, which will deal with the commercial aspects of the subject.

Practical Hints on Patents.—The technicalities and expense of patenting an invention act as a great deterrent to many inventors and undoubtedly a considerable quantity of inventions are never brought to light for these reasons. In the book "Practical Hints on Patents," by the well-known patent agent, Mr. M. E. J. Gheury de Bray, one finds a very simple explanation of the primary laws of patenting and written in such a manner that anyone can read and understand. Inventors may, by writing, secure a copy from the publishers, The Imperial Patent Service, First Avenue House, High Holborn, London, W.C. 1, free of cost.

Forthcoming Engagements

June.

3.—I.G.E.—Finance Sub-Committee, 1.45 p.m.; Membership Sub-Committee, 2.30 p.m.; General Purposes Committee, 3.15 p.m.; Council Meeting, 4.30 p.m.

4-7.—I.G.E.—Annual General Meeting in London.

11.—I.G.E.—Gas Education Executive Committee, 4 p.m.

12.—Coke Salesmen's Circle. — Meeting at 28, Grosvenor Gardens, S.W. 1, 2.30 p.m.

19.—Association of Statutory Inspectors of Gas Meters.—Annual General Meeting, County Hall, Westminster, 10.15 a.m.

19.—B.C.G.A.—Meeting of Executive Committee, 11 a.m.

20.—I.G.E.—Refractory Materials Joint Committee, Stoke-on-Trent. 2.30 p.m.

20.—S.B.G.I.—Council Meeting, 56, Victoria Street, S.W. 1, at 11 a.m.

21.—North of England (Auxiliary) Association.—Half-Yearly Meeting at Newcastle-upon-Tyne. Address by Mr. S. A. Wikner.

22.—London and Southern Junior Association.—Summer Visit to Winchester.

25.—Southern Association.—Visit to Guildford.

26.—I.G.E.—Oral Examinations in Gas Engineering and Gas Supply, Board of Examiners. 9.30 a.m.

28.—Waverley Association.—Annual Meeting in Edinburgh.

July.

5.—Manchester District Association.—Meeting at Cleckheaton.

6.—Western Junior Gas Association.—Summer Meeting at Weymouth.

9.—N.G.C.—Meeting of the Central Executive Board.

Sept.

12.—North British Association.—Annual Meeting at St. Andrews.

A New Use for Gas

Gas has been called upon in the past to perform many unusual functions, but few more novel, perhaps, than the part it plays in the Viennese dancing scene and water tableau in the non-stop "Revue Splendide" now running at the Prince of Wales Theatre, which has been described as the best tableau of its kind in the West End for years.

One wonders how many of those who witness this very beautiful and spectacular scene from the auditorium have the least conception of the amount of equipment necessary to stage it, or realize that without the assistance of gas the tableau would be difficult or impossible of achievement. For, even in these spartan days, the ladies of the chorus do not take readily to cold showers as part of their act—particularly when, apart from rehearsals, it has to be performed three or four times a day.

Recourse had, therefore, to be made to gas, and we were privileged to take a peep behind the scenes the other day while the show was in progress in order to see the remarkably efficient way in which gas has fulfilled a difficult task in a manner which probably no other fuel could achieve. So the fountains which give such a strikingly cool and refreshing effect, in their brilliantly colourful setting, are, in reality, pouring forth a hot shower.

By reason of the nature of the show, all the equipment and fittings, with the exception, of course, of the actual boiler units, had to be readily portable. The centre piece comprises a shallow semi-circular wooden trough some 16 ft. in diameter, which was constructed by the stage carpenters and suitably treated to render it water-tight. This has only a few inches of cold water in it during the scene, in order to prevent the flow from the fountains splashing over the other performers. In the centre of the trough is a pedestal on which the somewhat scantily-attired "nymphs" stand—three round the foot and a fourth on a further small platform above, the latter hiding the supply pipe to the central fountain. Across the front of the trough, the flat face of which is towards the audience, and from two centre jets play fountains, the former being cold as they do not actually touch the performers. The other fountains, however, round the base of the pedestal and from the top of it—which play upon the "nymphs"—have to be supplied with hot water. The two centre jets are also supplied with hot water from the boilers and function the whole 15 minutes of the scene, the pedestal fountains for the final 8 minutes.

For the provision of the hot water four No. 20 "Victor" gas-fired units were supplied by Messrs. Thomas Potterton (Heating Engineers), Ltd., of Balham, and these, coupled up in series, act without any storage as an instantaneous water heater, producing an unlimited amount of hot water within a few minutes of lighting up. The boilers are fitted with thermometers and are thermostatically controlled so as to provide water at over 100° F. at the outlet of the fountain jets. The consumption of the boilers is about 320 cu.ft. per hour, for which an enlarged service pipe had to be installed. The output of the boilers is 180 gallons per hour at a thermostat setting of 108° F. The thermometers indicate the temperatures at both ends of the pipe line, the boilers being some 60 ft. from the stage. A return pipe has been fitted so that, until the correct water temperature is reached, the flow is by-passed to waste without passing over the performers who have previously taken up their positions on the pedestal.

Messrs. Potterton, in conjunction with the Gas Light and Coke Company, were responsible for all the fitting work, which included a cold storage tank to give sufficient head of water for the fountains—as the Metropolitan Water Board do not permit of boilers being coupled direct to the main supply—also all piping, rubber connections, valves, &c., in addition to a waste pipe from the trough. The supply pipe from the boilers terminates at a point just below a trapdoor in the stage immediately behind the trough, from which the flexible hose and valve fittings are easily attached to the base of the pedestal.

The extreme portability of the equipment is particularly noteworthy, for the whole set has to be erected and connected to the water supplies and waste pipe in a very short space of time and disconnected and "stowed away" again immediately after the conclusion of the tableau. Messrs. Potterton are to be complimented upon an extremely neat and effective job, executed at comparatively short notice under the not too easy conditions often associated with the production of a show of this nature—which demonstrates once again the adaptability of gas.

"*Waters of the World*"—the Finale of the first half of La Revue Splendide at the Prince of Wales Theatre, London—a photograph specially taken for the "JOURNAL," through the courtesy of the Management of the Theatre, by "Sasha," of 7, Suffolk Street, S.W. 1. In order that the tableau might be photographed to the best advantage, the fountains of gas-heated hot water are not seen playing at their full pressure in the picture.

Loyal Address to H.M. The King

The Secretary of The Institution of Gas Engineers has received the following letter from the Secretary of State for the Home Department:

Home Office,
Whitehall,
17th May, 1935.

SIR,

I am directed by the Secretary of State to inform you that he has been Commanded by The King to convey His Majesty's thanks to the fifteen Engineering Institutions and Societies for their Address of Congratulation presented to His Majesty on the completion of the Twenty-fifth Year of His Reign. His Majesty much appreciates this expression of loyalty and devotion in which the President, Officers, and Members of The Institution of Gas Engineers have joined.

I am, Sir,
Your obedient Servant,
H. A. STRUTT.

Amalgamation and Grouping

Severn Valley and Newport (Mon.).

Severn Valley Gas Corporation announce that their recent offer to the stockholders of Newport (Mon.) Gas Company has been accepted by the holders of a substantial majority of the issued stock of that Company.

Acceptances for The Institution Meeting

We learn from the Secretary of The Institution of Gas Engineers that, according to tickets issued up to and including Saturday, May 25, the total attendance at the 72nd Annual General Meeting is expected to be 1,289. For the St. James' Park Gas Floodlighting 1,423 tickets had been issued up to the date in question.

The Society of British Gas Industries

French Quota for U.K. Glassware

We have received the following communication from Mr. M. W. Burt, Secretary of the Society of British Gas Industries:

"It is very gratifying to be able to report that as the result of strong representations, with which the Society has been associated, the *Journal Officiel* of May 17 announces that a quota for 33 quintals has been allotted to the United Kingdom for the present quarter for Lampware, Lanterns, &c., whether or not polished, burnished, varnished, tinned, lead coated, or galvanized, except miners' oil and spirit lamps (*ex* Tariff No. 574). Certificates under the quota will be issued by the Birmingham Office of the Federation of British Industries."

"Proprietors' Day" at the Croydon Works

Plant Inspected by 700 Visitors

At the Annual Meeting of the Croydon Gas Company last February a shareholder suggested that there must be many there who would welcome an opportunity of inspecting the Company's Works. This suggestion has been acted upon by the Directors.

That the Croydon Company are fortunate in having a very large number of shareholders who are keenly interested in the practical side of their activities, as opposed to those merely concerned with financial results, was evidenced on the afternoon of May 21, when a cordial invitation to inspect the Gas-Works was extended to every proprietor of the Company—as, perhaps, an additional Jubilee gesture on the part of the Directors. No fewer than 700 accepted. Such a response is indeed a tribute to the interest taken by the layman in the activities of the Gas Industry.

The visitors were welcomed at the Works entrance by Mr. William Cash, J.P., F.C.A. (Chairman of Directors), by other members of the Board, and by Mr. W. J. Sandeman (General Manager), supported by other senior officers of the Company. Divided up into parties of about fifty, they made a thorough inspection of the varied processes carried on at the Works—all of which were ably explained to them by members of the staff. The Works cover an area of approximately 40 acres, and are at the present time capable of converting 970 tons of coal, 120 tons of coke, and 9,000 gallons of oil a day, giving a yield of 21 million cu.ft. of gas.

The proprietors watched the discharging and quenching operations of the coke from the Woodall-Duckham intermittent vertical chamber oven plant, and were given an insight into the care which is taken by the Company to prepare suitable screened and graded coke for domestic and industrial purposes. The whole cycle of operations was followed right through to the benzole recovery plant. Great interest was evinced in the automatic operation of the Humphreys & Glasgow water gas plant, which has a total capacity of 4½ million cu.ft. a day, and is regarded as one of the best examples of its kind in the country. The up-to-date electric power house, where current at 6,600 volts is reduced to 220 volts by transformers and then rectified by means of mercury arc rectifiers, which feed into the Works 220-volt D.C. system, was inspected, as also were the well-equipped fire and ambulance stations, and spacious laboratories, while favourable comment was passed upon the general appearance and cleanliness of the Works.

At the conclusion of the tour of inspection, the proprietors were entertained at tea by the Company, and few can have left the Works without feeling, as a result of their visit, that they were connected with a very live and progressive undertaking.

Richmonds "Bungalow" New World Cooker

We have received a copy of a 20-page "Bungalow" New World Cooker Booklet which has just been issued by Richmonds Gas Stove Company, Ltd., Warrington (Radiation Ltd.). This new publication is artistically arranged and beautifully printed in full colours and should prove a powerful sales force in every gas showroom into which it finds its way.

The booklet deals fully with Richmonds Nos. 11 to 89 series of "Bungalow" New World cookers and also their Series 2 cookers, which are distinguished by their wide, deep ovens and tall legs. "Bungalow" New World ranges are also included. All three series are shown in "Rado" grey-mottled porcelain enamelled finish and in Richmonds "Beau" blue porcelain enamelled finish. In view of the choice of blue as the dominant Jubilee colour, the delightful blue finish is proving increasingly popular this year.

The new booklet contains separate pages devoted to the Radiation "Regulo" oven heat control and to the Radiation gas match, both of which are fully illustrated and described. Gas showrooms should have supplies of the booklet available with which to meet enquiries.

Recent Orders for Woodall-Duckham Continuous Vertical Retorts

Among recent orders received by the Woodall-Duckham Company for installations of continuous vertical retorts is one placed by the Loughborough Gas Department for a complete new installation of ten 44-in. upwardly-heated retorts.

This plant will be capable of carbonizing 42 tons of coal per day and will be provided with a complete coal and coke handling plant and coke-screening plant. The retort bench will be heated by means of two step-grate producers designed for breeze burning and an induced draught waste-heat boiler, arranged for supplementary firing by means of producer gas, will be installed.

The coke-screening plant which will be provided with a range of storage bunkers with a total storage capacity of 100 tons will include a Woodall-Duckham "Undulo" coke screen. The installation will be housed in a retort house of an impressive modern design of which the coke-screening plant has been made to form an integral part.

The Brecon Gas Company have ordered a plant, comprising a bench of three 44-in. upwardly-heated "W-D." continuous vertical retorts heated by means of two producers. The plant, which will be capable of carbonizing 10 tons of coal a day, will be erected at one end of the existing retort house and provided with the necessary coal and coke handling equipment.

The Woodall-Duckham Company have also received from the Elgin Gas Department an order for the extension of the continuous vertical retort plant (installed when the new works was built in 1930) by the addition of two further 53-in. retorts. The capacity of the plant will thus be raised from 37·5 to 50 tons of coal a day. In enlarging the retort house provision is to be made for the addition of further retorts when the need arises.

National Gas Council

Meeting of the Executive Board for Scotland

A Meeting of the District Executive Board for Scotland of the National Gas Council was held in the Central Station Hotel, Glasgow, on May 9. Sir WILLIAM E. WHYTE occupied the chair and presented the Seventeenth Annual Report.

In submitting the Annual Report Sir William outlined the principal points contained in it. He referred briefly to the Scottish Development Centre which, he said, was at present a Bureau of Information only. He hoped, however, that its activities and usefulness would be enlarged. The Housing (Scotland) Bill intimately affects public utility undertakings. Steps had been taken to press for provision being made for the payment of compensation to gas undertakings whose distribution systems have been rendered derelict by redevelopment schemes. The amendments provide for the costs incurred in executing any diversion, removal, or alteration of position of pipes, and other apparatus being repaid, and in providing and constructing, erecting, or laying down substituted apparatus.

Sir William then passed on to consider the section of the Report dealing with Gas Grouping and Holding Companies. This subject has obtained considerable prominence throughout the year and diverse opinions have been expressed as to gas administration being directed by financial influences with and without technical direction. During a number of years past a considerable amount of amalgamation, either by purchase or by bulk supply, has already taken place in Scotland. It was felt that geographical grouping of gas-works is a necessity, and that Directors of Company Undertakings where suitable areas and conditions exist should not hesitate to enter into conference with a view to a co-ordinated system of management. Such proposals should have regard primarily to the furtherance of the use of gas and the strengthening of its position throughout the country. Sir William issued a warning against the purchase of Company Undertakings by Holding Companies whose only objective is that of a financial investment. Companies, he said, should give immediate consideration to the possibilities arising out of amalgamation, and of having joint working arrangements; also to preserving the local influence and interests. The first movement should come from inside the Industry rather than from outside financial interests. Gas supply as a Public Utility is a secure and improving investment, and local administration and management on broad lines under a grouping system is a wise policy.

Proposed Gas Grid in Scotland.

Coke oven gas manufacturers had been assured that the Gas Industry of Scotland is most willing to discuss with them ways and means for utilizing the gas produced from the coke ovens for the supply of power and for domestic purposes wherever that can be shown to be of public advantage. Reference was also made to the proposal to establish a gas grid in Lanarkshire and Renfrewshire, which was recently put forward by the Commissioner for the Special Areas in Scotland. In this connection Sir William said that he felt that he spoke for the Gas Industry in Scotland when he said that they would welcome most cordially any proposals which were designed to secure a reduction in the price of gas and to ensure its greater use not only for industrial but for domestic purposes. The proposals which had been made, so far, were entirely technical, but the Scottish Executive Board were of the opinion that it would expedite a consideration of the whole proposal if the Commissioner would submit an outline of the financial and administrative aspects relating to the scheme.

At this point Mr. Braidwood, of Coatbridge, explained that, at the moment engineers and managers in the affected areas of Lanarkshire and Renfrewshire were discussing with the Commissioner and his technical expert, Dr. Birkett Wylam, the practical side of the proposal. It was decided that the Executive Board should await the outcome of these discussions.

Points arising from the Memorandum of proposals relating to valuation, issued by the Secretary of State for Scotland, were mentioned in the Report. A Special Committee had been appointed to examine these proposals and this Committee recommended that the proposals relating to Municipal Gas Undertakings contained in the Memorandum should be rejected and the *status quo* maintained. This Special Committee appointed a Sub-Committee to investigate and report on (*a*) the Revenue Principle; (*b*) its application to Gas Undertakings, and (*c*) to make suggestions for modifications so that uniformity and equity be obtained. Mr. Imrie, City Chamberlain, Edinburgh, a member of the Sub-Committee, was asked to furnish a report and formulate examples of necessary improvements in the present system. The points from Mr. Imrie's proposals are as follows:

(1) *Depreciation and Renewals.*—A standard rate of depreciation based upon the estimated life of the assets of each concern should be allowed as a charge against the revenue in arriving at the valuation.

(2) *The Period of Spread for Obsolescence Allowances where plant becomes obsolete before the Original Debt is cleared off.*—Where plant becomes obsolete in such a case, the amount of debt outstanding on the original plant should be allowed as an additional revenue charge.

(3) *The Problem of Surplus Works or Works in excess of Immediate Requirements.*—Where plant in excess of immediate requirements has been installed some allowance should be made in respect of this.

(4) *Works in Progress from which no revenue is yet obtained.*—In all such cases the total revenue forming the basis of the valuation should be subject to a deduction equivalent to any interest paid, along with any sinking fund charges on works in progress until these enter into production.

(5) *Working Capital.*—(*a*) It is found in practice that different determinations have been made in this respect, and it is thought that a much more reasonable result would be obtained if 5% on half the annual expenditure met from revenue were adopted as the standard for all undertakings. (*b*) Provisions might be made on the lines of the general rules under the Rating and Apportionment Act, 1928, to define Tenants' Chattels (or, if it be easier, to define Landlords' Chattels) and to allow a fixed percentage of 17½ on the value thereof as is at present granted to Railways and other Public Undertakings in England.

Gas Undertakings Act, 1934.

As regards the Gas Undertakings Act, 1934, the Report showed that the Bill in its original form intended to include Non-Statutory Concerns in Scotland. Representations had been made in the proper quarter and when the Act received the Royal Assent on June 28, 1934, the Scottish Companies were excluded from the obligation to become Statutory Gas Undertakings.

The Report also showed that it had been decided to appoint an Officer in Scotland and, after some discussion on the relative merits of Glasgow and Edinburgh, it was decided that an Office should be opened in Glasgow.

The final section of the Report dealt with the Scottish Education Scheme. The sum of £158 had been collected from the undertakings and this was distributed as follows: The Royal Technical College, Glasgow, and the Heriot Watt College, Edinburgh, £60 each; Technical College, Dundee, £30.

Colonel Ogilvie's Address.

After the Report had been approved Colonel S. S. Ogilvie, Joint Manager, National Gas Council, addressed the meeting. Colonel Ogilvie said that he would like to touch one or two points of interest to Scotland alone, and referred first to rating. He said that the proposals put forward by Mr. Imrie were, on the whole, very sound. He had no doubt that the practice of profits principle in Scotland was definitely prejudicial to the undertakings. The assessments were higher in Scotland than in England, and this was largely due to the difference in considering Tenants' Chattels. He was glad that it was now proposed to allow a fixed percentage of 17½.

He was very much in favour of the establishment of a Scottish Office, and said that he would like to see common districts for all the National Gas Associations. Without this it was almost impossible for a national representative to act for all districts. There should be a common official and a common office where problems could be considered and remitted to the national body. Colonel Ogilvie then

ade a few remarks on more general subjects. He said embers of the Industry were really heat purveyors supplying heat for intermittent periods and for domestic ooking. He was glad to see the development of Industrial Centres as those gas undertakings with industrial oads were showing improvement because the industrial oad balanced and counterbalanced the effect of climatic onditions. The Centre in Scotland was at present a ureau of Information only, but he hoped that it would evelop further and send out emissaries to get industrial usiness. Other Centres had found that it was essential o have an excellent personnel, and when this was the case ndustrial loads increased. To this end it was necessary o jettison the old flat rate of charges. About eighteen onths ago Mr. Fottrell had given this important matter is closest attention and had issued a Memorandum giving clear justification for departure from flat rates and inicating how this could be effected. All in the electrical ndustry were agreed that if they had not departed from he flat rate no advancement would have been made. He oped that everyone concerned would give this matter lose attention, as it was by this means alone that they tood a chance of decreasing the decline in the consumption er consumer.

With regard to the Housing Bill, Colonel Ogilvie said hat the Conjoint Conference had been successful in obtaining a large number of amendments which would safeguard Public Utility Undertakings in respect of such matters as (*a*) compulsory acquisition of land, and (*b*) compensation with regard to sterilized mains and cables. The Conference had put forward claims for compensation in respect of loss of business and in respect of pipes and wires in houses which were about to be demolished. The Government, however, were resisting these claims for compensation and the matter was still being negotiated.

On the question of amalgamation Colonel Ogilvie said hat grouping was a question of policy while holding companies were a matter of machinery. There was no unanimity in the Industry and anything he said on this subject was his own private opinion. Grouping is a very essential policy, but it should emanate from the Industry. When efforts are made by concerns not gas minded these efforts should be rejected. It was absurd to suggest that companies with no knowledge of public utilities could be in the best interests of the Gas Industry and its consumers.

Colonel Ogilvie then referred to the National Organizations. He pointed out that the function of each of these was defined and limited, and it had been impossible in the past for any Organization to represent the Industry in all its aspects and all its activities. To remedy this position the British Gas Federation had been formed, embracing the Society of British Gas Industries, which represented the manufacturers of plant and appliances. This Federation could truly speak for the Industry as a whole. They had been fortunate in obtaining Lord Macmillan as their first President.

Election of Officers for 1935-36.

Chairman.—Sir William E. Whyte.

Vice-Chairman.—Mr. T. Maule Guthrie, Brechin.

Committee.—Mr. George Braidwood, Coatbridge; Mr. James Campbell, Dunfermline; Bailie Gowans, Perth; Mr. George Hamilton, Barrhead; Mr. T. W. Harper, Ayr; Mr. R. D. Keillor, Greenock; Mr. John Lang, Vale of Leven; Mr. Samuel Milne, Aberdeen; Councillor W. Muter, Edinburgh; Mr. A. S. Nisbet, Paisley; Mr. H. G. Ritchie, Falkirk; Mr. John Wilson, Dundee.

Secretary.—Mr. J. W. Napier, Alloa.

Mr. Napier was re-elected as a Representative on the Central Executive Board.

The British Gas Federation Visit the Fair

Members of the British Gas Federation paid a visit to the British Industries Fair at Castle Bromwich on Wednesday, May 22, when they were entertained by the Birmingham Chamber of Commerce.

After making a tour of the Exhibition, the members of the Federation sat down to luncheon under the chairmanship of Mr. G. PHILIP ACHURCH (Vice-President of the Birmingham Chamber of Commerce). Those present included the Lord Mayor of Birmingham (Alderman S. J. Grey), Mr. T. J. Kennedy (President of the Birmingham Chamber of Commerce), Sir David Milne-Watson, Sir Francis Goodenough, C.B.E., Mr. C. Valon Bennett (President of The Institution of Gas Engineers), Alderman J. H. Lloyd (ex-Chairman of the Birmingham Gas Committee), Alderman J. H. Hume (Chairman of the Birmingham Gas Committee), and Mr. A. W. Smith (General Manager and Secretary of the Birmingham Gas Department).

The LORD MAYOR OF BIRMINGHAM expressed a cordial welcome to the visitors in the name of the City. The Fair, he said, was a fine effort to stimulate the trade of the country and he hoped that it would be of benefit to business not only nationally but internationally.

Proposing the toast of "The Gas Industry," Mr. G. PHILIP ACHURCH said it was with much regret that he had to strike a note of lament over the fact that the group of firms which had formed a valuable division in the Fair, classified as the Gas Section, was not to be seen this year.

They might even think the Committee had invited them so that they might see what they had missed, and that there was some sinister motive in bringing them through the Electrical Section in all its glory as a touching reminder of its existence. He could assure them it was with the honest intention of giving them the best hospitality the Fair afforded that they were invited, and he believed they would admit that there were many improvements over previous Fairs.

"You will notice this year that the old-fashioned type of stand has been replaced by the more modern open type," Mr. Achurch continued, "and our exhibitors are to be congratulated on the handsome manner in which they have responded to the lead of the General Manager. You would think me but a poor representative of the Fair Management Committee if I did not at once freely admit that I am sorry we cannot include a Gas Section in our catalogue. The Gas Industry has been associated with the Birmingham section of the Fair since its inception, and I feel convinced that this association will be renewed in future years. I am particularly anxious that this should be so, not from the viewpoint of the letting of space in the Fair—for we have no trouble in letting the whole of our available space, in fact, it is the necessity for annual extensions which strains our finances—but because I recognize the important part that the Gas Industry has played and the still more important part it must play in future in the industrial life of this country."

Sir DAVID MILNE-WATSON (Chairman of the Council of the British Gas Federation), in response, said it was exceedingly kind of the Fair authorities to invite them there that day especially as he supposed the Gas Industry would be regarded as defaulters on that occasion. He had walked round the Fair that morning and would like to pay a tribute to the wonderful exhibition that had been arranged. It was a revelation of the activities and energies of the British manufacturer, and he was certain that no country in the world could compare with that or get together a number of manufacturers of greater prestige or of a more representative character.

Reference had been made to the absence of the Gas Industry as such from the Fair. He did not propose to enter into the reasons at any length, but one was that May was not felt to be a suitable month in which to display gas apparatus. Well, they did not know what weather they were going to have in Great Britain. They had summer temperatures in December as those in the Gas Industry knew to their cost, and they had now got winter in May. He had found himself standing alongside a gas coke fire with the greatest amount of pleasure that morning. It had been mentioned that that was the first official visit of the British Gas Federation outside the Metropolis, and he felt sure they would agree that no more appropriate place than Birmingham could be found for that purpose. Bir-

mingham had always been famed for its municipal work and for its manufacturing enterprise. They were proud to be in that great centre of industry. But Birmingham had not only a great record as an industrial city, it was also famed as a gas city, and he was particularly glad to see present that day Alderman J. H. Lloyd, the former Chairman for many years of the Gas Committee of the Corporation, and the present Chairman, Alderman R. H. Hume, and last but not least his old friend, Mr. A. W. Smith, to whom the Gas Industry, not only in Birmingham but in the country generally, owed so much. It was appropriate that they should have come there that day. The Gas Section of the Fair was originally organized by the joint effort of the Gas Industry and it was symbolical that they should hold one of the first meetings of the British Gas Federation in that building because that Federation represented the consolidation of all the national gas forces for the first time in their history as an industry.

That function, however, was not a funeral service. There were those in the country, not in that room of course, but he had not far to look, who would very much wish them dead. "We have no intention of dying just to oblige them," Sir David said, "and as a matter of fact we are very much alive to-day."

Sir David concluded with an account, peculiarly suitable to this Jubilee year, of some of the progress made by the Gas Industry in the past twenty-five years, leading to a position in which they felt to-day that they belonged to a great industry, with a great past and a great future, an industry that was in his opinion one of the greatest public utility industries and one of the greatest benefactors to the weal of this country. It was inevitable, indispensable, and invaluable.

Mr. C. VALON BENNETT (President of The Institution of Gas Engineers) proposed the health of the President of the Birmingham Chamber of Commerce (Mr. T. J. Kennedy) and expressed the thanks of all present to the Birmingham Chamber of Commerce for their hospitality.

Mr. KENNEDY said he had said nicer things of the Gas Industry than any other industry not excluding his own, so that it was ironical that in his year of office the Industry should be absent from the Fair. He believed they would inevitably come back because he did not think any great industry could afford to be permanently out of the Fair.

The Prince at the B.I.F.

We learn from Messrs. Sidney Flavel & Co., Ltd., that the Prince of Wales visited their stand during his recent tour of the British Industries Fair, Castle Bromwich, and that among the exhibits which attracted his attention was the "Kabineat" Cooker. It was explained that this cooker satisfied the requirements of those who wanted a gas stove of refined character and modern finish, in entirely closed form and complete with all necessary equipment. His Royal Highness, we are told, described it as a fine idea, since nobody wishes a scullery to look like a scullery all the time.

It is interesting to note that the house of Flavel dates from 1777, and its career has continued uninterrupted through six reigns and six Royal Jubilees, including this year's Silver Jubilee of King George V.

The Whessoe Foundry and Engineering Company

Some Recent Orders

The Whessoe Foundry and Engineering Company of Darlington announce that they have in hand a number of orders for their W. W-D Electro Detarrers. They state that the advantages of complete tar fog extraction by electrostatic precipitation are being increasingly recognized. Among work in progress and under construction are the following: Manchester Corporation Gas Department, a 5 million cu.ft. per day W. W-D Electro Detarrer for the Partington Works; Isle of Thanet Gas Company, a 2½ million set for Margate: The British (Guest, Keen, Baldwins, Ltd.) steel works at East Moors, Cardiff, 2 coke oven gas detarrers, 17 million cu.ft. per day, Workington Iron and Steel Company, Ltd., 3 detarrers for treating 12·5 million cu.ft. per day, and Barnsley District Coking Company, 2 detarrers of 15 million cu.ft. of coke oven gas per day combined capacity. The volumes stated above refer to throughputs at N.T.P. The last three W. W-D Electro Detarrers mentioned are to the order of the Woodall-Duckham Company, and all sets include the English Electric Company's patented system of direct D.C. generation of the H.T. current.

In addition to the above orders, the Whessoe Company report a contract for a spherical high-pressure gasholder for the outer London district, and orders for water tube condensers are in hand. This Company have also just received the contract for 2 Whessoe Rotary Washer Scrubbers for ammonia and benzole extraction, each of 4½ million cu.ft. per day. A number of producer gas cleaning plants are also under construction, and a ¼ million cu.ft. per hour blast furnace gas cleaning plant is in process of completion at Messrs. Colville's Clyde Ironworks.

The Whessoe Company also have a good volume of orders for tanks, process vessels, and steel plate work, including a batch of 75 welded tanks for a commercial solvents factory near Liverpool. Many oil tanks and a number of Wiggins floating roofs for this country and abroad are under construction, and a complete oil installation has recently been secured for Sunderland Harbour. Weighbridges are also going through the Whessoe Company's shops in better numbers.

Generally speaking, if prospective business matures at the same rate as in the last few months, the Whessoe Company consider the outlook may be regarded with some confidence.

A New Tube Bending Machine

With the increasing use of copper tube for domestic gas fitting work and the demand for appliances which require to be installed not only in new buildings but in rooms which have already been furnished, there has been created a need for a tube-bending outfit which requires no fixing and which can be operated in the actual room in which the work is being carried out, thus saving the fitter running up and down stairs to his bench.

The "Hilmor" Portable Tube-Bending Outfit.

The outfit illustrated here has been developed by Messrs. Hilmor, Ltd., of 65, Southampton Street, N. 1, and it is claimed to obviate the necessity for moving furniture in order to bend long sections of tube, while it can be carried about with ease from room to room. The machine is extremely light and has been specially designed to deal with the most usual sizes of tubing required for domestic fitting work—namely, ½-in. and ¾-in. bores. An additional feature is the tube grip, which will be found useful for cutting off, filing ends, and for holding the tube while heating when solder joint fittings are employed.

The standard vice grip has been designed to hold light gauge copper tube without damage; but if the outfit is desired for use with steel conduit, a special grip is supplied for screwing. Our photograph shows the machine in the downward position for short ends, while it may be reversed for long ends. The whole folds up neatly and is easily portable.

THE INSTITUTION MEETING

JUNE 4—7, 1935

In the following pages are abstracted the papers to be presented at the 72nd Annual General Meeting of The Institution of Gas Engineers, to be held in London next week under the Presidency of Mr. C. Valon Bennett, of Rochester.

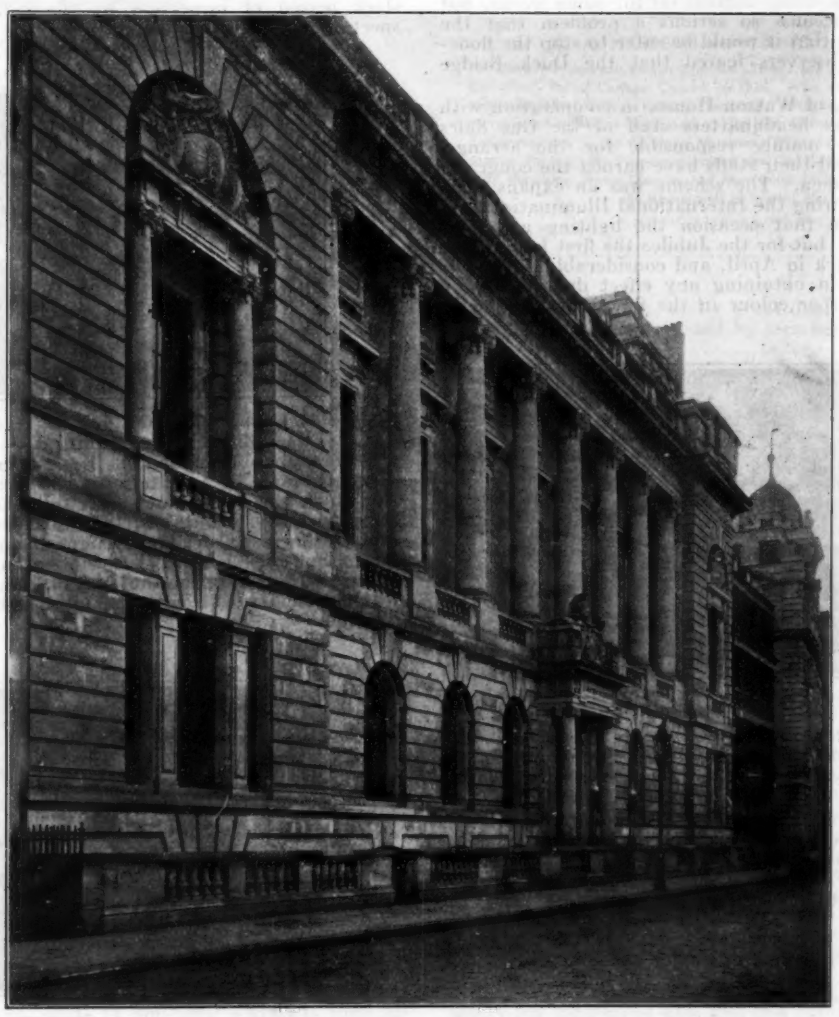


Photo. by Bedford Lemere

The business sessions will be held in the Great Hall of the Institution of Civil Engineers, and through the courtesy of that Institution we are able to publish above a photograph of their Headquarters in Great George Street, S.W.1

Gas Floodlighting of St. James' Park

Special Extension for The Institution of Gas Engineers

By permission of H.M. Office of Works, the Gas Light and Coke Company are floodlighting St. James' Park from June 4 to 7 during the 72nd Annual Meeting of The Institution of Gas Engineers—as during Jubilee week

Enormous crowds were attracted to the gas floodlighting of St. James' Park during Jubilee Week. Indeed, the popularity of the show caused it, somewhat paradoxically, to have only a short run. Hopes had been entertained of the floodlighting being carried on for some weeks, but the crowds had become so serious a problem that the authorities decided that it would be safer to stop the floodlighting. Some observers feared that the Duck Bridge might collapse.

Mr. F. C. Smith, of Watson House, in co-operation with Mr. Helyar, of the headquarters staff of the Gas Sales Department, were mainly responsible for the arrangements, and they and their staffs have earned the congratulations of all gas men. The scheme was an expansion of that carried out during the International Illumination Congress in 1931. On that occasion the lighting was done during September; but for the Jubilee the first lamps were installed in the Park in April, and considerable difficulties were experienced in obtaining any effect due to lack of leaves on the trees or colour in the flower beds. During

the period of initial test the weather remained cold, and only by a margin of a few hours did the flowers and foliage develop sufficiently to enable the floodlighting to give the required effect.

The scheme involved the running of about five miles of supply and the use of nearly 300 lamps. The bulk of the lighting was carried out with about 130 parabolic projectors by Messrs. Wm. Sugg & Co. (originally developed in 1931 by co-operation between Watson House and the makers), together with 120 "Vertiflood" lamps manufactured by Messrs. Wm. Edgar & Co. to Watson House registered design; about 40 miscellaneous lamps were used, together with two gas flares on the Duck Bridge burning 300 cu.ft. of gas per hour each.

The parabolic projectors, with a gas rate of 25 cu.ft. per hour, threw a beam of the order of 20,000 candle power. The "Vertiflood" lamps operated at a gas rate of 16 cu.ft. per hour with a correspondingly less intense beam. So far as the total candle power operating in the Park can be expressed, it was of the order of 5 million, representing a gas consumption of about 5,500 cu.ft. per hour.

Steps were taken early in the preparations to stencil the Company's name on the lamps in visible lettering. It was impossible to estimate the number of visitors passing through the Park to view the floodlighting during Jubilee Week, but a count at one single point during a relatively slack period of inspection by the public showed 12,000 spectators passing per hour.

St. Mary Abbott's Church, Kensington, may be quoted as an example of an alternative type of floodlighting by gas which has been most successful. For this lighting 25 Sugg parabolic projectors, together with 4 "Vertiflood" lamps were used, 7 of the lamps being mounted on adjacent houses. A satisfactory degree of illumination was obtained to the top of the spire 320 ft. high. The effect was obtained with a gas consumption of about 700 cu.ft. per hour.

The photographs reproduced on this page, together with some further views in the Park and of St. Mary Abbott's Church, Kensington, which were given in the "JOURNAL" for May 8, leave no doubt as to the outstandingly beautiful effects which have been obtained by this remarkable floodlighting installation, which it may rightly be claimed could be effected by no other form of illuminant.

NATIONAL POLICIES GOVERNING
The Testing of Gas Appliances

by

STEPHEN LACEY,
B.Sc., M.Inst.C.E.,
Controller of Gas Sales,

and

C. A. MASTERMAN,
M.A., F.I.C.,
Chief Technical Officer, Watson House,
Gas Light and Coke Company

STEPHEN LACEY, B.Sc., M.Inst.C.E.

Mr. Lacey obtained his engineering training at the City and Guilds College, South Kensington, and after five years with Messrs. G. H. Hill & Sons, Consulting Engineers, entered the service of the Gas Light and Coke Company in 1911 as assistant to the then Distributing Engineer, Mr. H. S. Reeson, whom he succeeded in 1918. In 1923 he was appointed Deputy to Sir Francis Goodenough, devoting special attention to the technical activities of the Departments which, in 1926, were brought together in Watson House. On the retirement of Sir Francis in 1932, Mr. Lacey became Controller of Gas Sales.

C. A. MASTERMAN, M.A. (Oxon.), F.I.C.

Mr. Masterman was educated at Gresham's School, and gained a Natural Science Exhibition, Balliol College, Oxford, in 1914. After the war he resumed his studies at Balliol College, reading chemistry. After taking the Degree of B.A., he remained at Oxford on research for the War Office, and later was appointed Senior Assistant in the Defensive Munitions Department at the Experimental Station, Porton. Mr. Masterman joined the Gas Light and Coke Company in 1927, becoming Senior Chemist, and later Chief Technical Officer in charge of the laboratories at Watson House.

UNITED STATES OF AMERICA.

Introduction.

Organized examination and testing of gas appliances has been in existence in the United States of America for a longer period of time than in any other country, and perhaps for that reason is the most complete system in the world at the present time.

Canada is closely connected with the United States in this matter and uses the same central organization—the American Gas Association—which embraces the functions which in Great Britain are carried out by The Institution of Gas Engineers, The National Gas Council, The British Commercial Gas Association, The Gas Companies Protection Association, and The Society of British Gas Industries.

Origin.

The idea of a central testing agency had its origin within the Gas Industry itself. As far back as 1915 definite plans were under way for the establishment of such an institution and their adoption was prevented at that time only by the entry of the United States into the World War.

After the War, consideration was again given to the problem. Leakage of raw gas from defective flexible connections and gas cocks, and bad combustion from appliances, were responsible for a number of accidental deaths. The possibility of accident due to bad combustion was at that time scarcely appreciated, and an inquiry was carried out, for instance, in Baltimore, Maryland, as a result of a number of mysterious deaths for which bad combustion was ultimately found to be responsible. As a further example of the unsatisfactory state of affairs, in December, 1924, in Los Angeles, California, 28 fatal gas poisonings occurred, of which 19 were definitely attributed to faulty appliances, while 14 non-fatal accidents were all found to be due to the same cause.

Investigations were carried out by various health departments in co-operation with the local gas undertakings, the results of which confirmed the need for action by the Gas Industry and therefore assisted, to some extent, in the development of suitable gas appliance standards.

Funds necessary for the establishment of the American Gas Association Testing Laboratory were supplied by member gas undertakings, and a great deal of the original testing equipment was provided by member manufacturers.

Procedure.

The policy of the American Gas Association towards gas appliances is determined by two separate committees, the Approval Requirement Committee, and the Laboratory Managing Committee.

The Approval Requirement Committee formulates the tests to be determined, the method of carrying them out and the standards to be adopted. This Committee consists of representatives of the appliance manufacturers and gas undertakings as well as the United States Bureau of Standards, United States Bureau of Mines, Public Health Service, United States Bureau of Home Economics, Home Economics Association, National Safety Council, Heating and Piping Contractors National Association, American Institute of Architects, Associated Factory Mutual Fire Insurance Companies, and Master Plumbers' Association. The test methods, prepared by sub-committees, are submitted to the Industry for comment before final approval. There are 32 sub-committees in existence at the present time preparing standard test methods.

The methods of test are revised when necessary. For example, the requirements for gas ranges first issued in 1926 have been revised five times, and a sixth revision has been circulated for criticism. Approval requirements are issued at least one year before they come into operation. Revised schedules are issued at least nine months before they are enforced. During this period the laboratory applies the revised tests to appliances being certified under the existing schedule, and so gains experience with the revised schedule.

The Approval Committees' primary object is to ensure safety for the user of gas, and this comprises freedom from explosion, leakage of gas, bad combustion or fire hazard. The approval requirements also cover strength and corrodibility of components, the deterioration of which in use may lead to the foregoing hazards. In addition, minimum requirements for thermal efficiency and all other pertinent characteristics are stated.

The problem of standardized tests is complicated by the wide variation in gas quality and pressure. The approval

requirements have to cover manufactured gas of all grades, natural gas and mixtures of the two, as well as butane and propane compressed in cylinders.

The Laboratory Managing Committee controls the testing, payment of fees and issuing of certificates. Application for test is made on a standard form, which together with the appropriate test fee is sent to the American Gas Association Laboratory at Cleveland or to the branch laboratory at Los Angeles. (The scale of fees is reduced for members of the American Gas Association.) The sample appliance is then submitted and tested according to the current approval requirements. No attempt is made to grade the appliance as to merit; it either passes the tests or fails. Although there is some feeling that grading would be useful, it is considered unworkable and would lead to argument and possibly to litigation by manufacturers whose appliances were approved as of low grade. If the appliance fails to meet with approval, the manufacturer is given a complete report of its defects, but no attempt is made to redesign the appliance for him, although each manufacturer has available the full facilities of the laboratory in making the necessary changes. This report is quite private and no list of unapproved appliances is circulated.

Approval of the appliance is followed by the issue of a certificate and a right to use the A.G.A. seal on all appliances of the same construction. The certificate is only valid for a year, but can be renewed from year to year up to a maximum of five years after the original test, after inspection by laboratory officials to ensure that the design and construction have not changed. (For example, 68% of the gas ranges first submitted for approval in 1928 have been recertified yearly until 1934.) Any retesting then required is kept to a minimum in order to save the manufacturer expense.

There is no regular examination of bulk deliveries to ensure that they are up to the standard of the sample, but the public, gas undertakings, or rival manufacturers can appeal to the American Gas Association if they consider that appliances are being sold bearing the seal but not satisfying the standards. In the event of the objection being justified, the manufacturer in question loses the right to use the seal on his appliances.

The Scheme in Practice.

The scheme has received the almost universal support of gas undertakings and appliance manufacturers. Many undertakings have pledged themselves to purchase, and many appliance manufacturers have agreed to market, only those appliances which fulfil the A.G.A. requirements. Since the laboratory's inception, approximately 8,500 appliances have been tested, the results of tests being extended to more than 25,000 separate models by inspection. The revenue in test fees has amounted to a quarter of a million pounds sterling in ten years.

99·8 per cent. of all appliances submitted have had to be corrected in some way or other before final approval has been given. The fixing of a standard and the testing of appliances to this standard have resulted in a marked improvement in performance, and while appliances have become more complicated service complaints have been reduced. Cases of accidental asphyxiation in New York have declined steadily since 1926; in Baltimore a reduction of one-third was reported in the interval 1930-33; while in the United States as a whole the death rate due to accidental asphyxiation due to all causes declined steadily during 1928-1932 by 5 per cent. per annum; a total reduction of 19·2 per cent. in all. The improvement is chiefly attributed to the operation of the testing scheme in raising the standard of gas appliances and fittings.

As has been mentioned earlier, the A.G.A. scheme of certification was started at the time when public authorities were drafting by-laws, *e.g.*, Baltimore, Maryland, to reduce the large number of accidents which were occurring due to carbon monoxide poisoning. By-laws have since been passed by many cities, *e.g.*, Los Angeles, 1927, New York, 1926, Hartford, Connecticut, 1927, Berkeley, California, 1927, Pasadena, California, and others. These laws require the registration of all persons engaged in either selling or installing gas appliances, and lists of approved appliances are circulated to these persons; no other appliances may be installed. These lists of approved appliances are generally confined to those certified by the A.G.A., so in effect the approval requirements of the A.G.A. are enforced by local government Acts. The right of the city councils to insist on A.G.A. requirements has been legally contested by certain appliance manufacturers but, although amendments have been made in some ordinances eliminating direct reference to A.G.A. requirements, in principle the A.G.A. requirements have remained operative.

A number of the larger undertakings maintain their own laboratories in which appliances are tested; and, as a result of such tests, an appliance which has been approved by the A.G.A. may nevertheless be considered of insufficient merit for sale to the public. Research and development are in progress in the laboratories both of the undertakings and of the appliance manufacturers, while a limited number of specific research problems have been undertaken under committee control in the laboratories of the A.G.A.

GERMANY.

Origin.

The initiative in systematic testing in Germany was first taken in 1929 and the policy was supported by certain of the large gas undertakings but initially was opposed by certain of the manufacturers on the grounds that progress would be hampered and that the scheme would not lead to results beneficial to the Gas Industry as a whole. Opposing views were only reconciled when a scheme was proposed of very flexible character which would not remove from the appliance makers their sense of responsibility for their own product.

The controlling authority is the DVGW (Deutscher Verein von Gas- und Wasserfachmännern), and on the committee of this body dealing with gas appliance testing there are represented the undertakings, manufacturers and independent scientific authorities.

Procedure.

The general principle of the scheme is to allow any maker to use the approval badge of the DVGW on any appliance —the maker in doing so accepting full responsibility that the appliance fulfils the standards laid down by the DVGW Committee (DI Normen). It is open to any other maker or gas undertaking to have tests carried out on any badged appliance, the performance of which appears to be in doubt. Any such appliance can be submitted to one of four recognized testing laboratories.

Of the four recognized testing laboratories, two are attached to gas undertakings (Berlin and Munich) and two are private laboratories run by technicians of recognized ability, viz., Herr Frei, of Hamburg, and Professor Dr. Bunte, of Karlsruhe.

A manufacturer may send a sample to any of the recognized laboratories for test, on payment, to the laboratory, of a standard fee varying with type of appliance. With the appliance he must supply technical data giving, *e.g.*, for a water heater:—

(*a*) type; direct or indirect, open or closed (pressure proof or not);

(*b*) manufacturer; works number, descriptive type number, catalogue rating, sent in by ....., date of arrival;

(*c*) measurements, weight, material, finish, water content;

(*d*) dimensions of gas, water, and flue connections, description of water ways, method of heat transfer, and flue ways, type of draught interrupter (other than baffler), type of baffler;

(*e*) construction of burner, gas and water cocks, automatic valve, thermostat, slow ignition device, &c.

The following must be supplied in triplicate:—

(1) durable drawings of the type specified in DIN 823 and 824, general lay-out one-fifth scale, burner cocks and other parts full scale;

(2) photographs of the appliance;

(3) relevant sales literature.

As already stated, a manufacturer may also on his own responsibility use the approval sign "DIN-DVGW," if he is convinced that his appliance conforms to the published standards. His doing so is controlled:—

(A) by his competitors, who may charge an offender with unlawful competition;

(B) by the four laboratories, who may challenge any manufacturer;

(C) by the German Standards Committee (Deutsche-Normenausschuss) who have registered the sign "DIN-DVGW" as a sort of trade mark and may, by legal action, compel offenders to discontinue the use of the sign.

Competitors or the recognized laboratories may bring offences to the notice of the Committee.

There is thus no compulsion to send an appliance for test, but in his own interests a manufacturer will do well to submit samples before using the sign of approval.

There appears to be little co-operation between the four laboratories, though this is in process of being strengthened. Other laboratories have applied to be

recognized as testing stations, presumably on grounds of enhancement of prestige.

The Scheme in Practice.

The scheme has not been in operation sufficiently long to prove its value, but certain manufacturers are still opposed to its operation on the grounds that the DVGW badge tends to take precedence over their own trade marks. They also have in mind that the undertakings may come to rely unduly on the presence of the official badge which may decrease the undertakings' feeling of responsibility towards the public in respect of these appliances.

The system does not appear as yet to have received any official or legal recognition, though organizations such as the DVGW themselves receive a degree of official support.

FRANCE.

Origin.

The progress of the Gas Industry in France has been somewhat hampered by the limited use the French public makes of gas—in part due to national habit, in part due to lack of enterprise by the gas appliance manufacturers, and in part due to the competition of oil and electricity.

The system of test was initiated in 1929 by the undertakings acting through the A.T.G. (Association Technique de l'Industrie du Gaz en France), under pressure from the authorities in Paris who were concerned at the number of fatalities due to geysers. The collateral benefit it was hoped would follow the setting up of a testing organization was that the appliance makers would be stimulated to produce better appliances and so to create a greater interest in gas among the general public.

The operation of the system appears to be almost wholly in the hands of the gas undertakings acting in co-operation, and the standards to be maintained are determined by a committee exclusively composed of their representatives.

The scheme became effective as from 1st January, 1930, the first appliance tested being approved in April, 1930.

The standard of tests drawn up is periodically revised by the A.T.G.

Procedure.

Anyone desiring to have an appliance tested must:—

(1) fill in application form and submit "technical data" giving full details of:—

- (*a*) proprietary name and number;
- (*b*) characteristics (output, gas rating, purpose, selling price, &c.);
- (*c*) description, with drawings;
- (*d*) method of use (preferably engraved on metal plate fixed to appliance);
- (*e*) installation instructions.

(2) pay a fee, fixed for each class of appliance, the scale of charges being revisable annually;

(3) at his own expense send for test to laboratories specified by the A.T.G., two samples (consecutively manufactured) which may be chosen by the A.T.G. from existing stocks. If approved one of these is retained as standard sample for the period during which the approval is valid;

(4) agree:—

- (*a*) to show on catalogues, leaflets, &c., only the values of output, efficiency, &c., obtained in the tests,
- (*b*) to make no change in descriptive name, which must, together with the name of the manufacturer, be indelibly marked on the appliance,
- (*c*) to use the generic name specified by the A.T.G. (*i.e.*, classified as single point geyser, multipoint, &c.),
- (*d*) to accept the conditions and decision of the A.T.G.

The appliance has to fulfil definite requirements in respect of serviceability, efficiency, robustness, durability, safety, convenience and appearance, but only the strictly technical requirements are published. These may be modified periodically to allow of progress, but are valid for a minimum period of two years. Any changes introduced are fully enforceable a year after publication. For the first six months appliances meeting the older requirements are accepted; for the second six months approval, to the new standards, may be given in anticipation, but is not valid until the new requirements are in force. Tests are made in *two* laboratories which compare results and the Committee of the A.T.G. decides whether the appliance is approved or not. The A.T.G. reserves the right to simplify the tests on appliances essentially similar to types already tested and approved, with the object of avoiding unnecessary tests (for example, if minor modification is made to approved appliance the part concerned only would be examined).

Approval is valid for two years from the date of acceptance, and is renewable annually at no further charge if the appliance meets the then current requirements.

The approval badge carries the monogram "A.T.G." but does not refer to the approved gas rate, which, however, the makers are encouraged to state in their instruction cards, &c.

If changes are introduced without notification to the A.T.G. subsequent to approval, the manufacturer is warned or the approval may be suspended, under threat of legal action. The A.T.G. does not employ inspectors for this control but relies upon receiving reports from users or from gas undertakings or from rival manufacturers.

The Scheme in Practice.

Up to date about 320 appliances have been examined, of which 120 only have been accepted. It is considered that the introduction and co-ordination of testing has stimulated the manufacturers whose initiative had perhaps remained dormant under the operation of heavy protective tariffs.

Most of the appliances exhibited for sale by the gas undertakings bear the A.T.G. stamp, but unstamped appliances are sold by retail dealers who may be more concerned with immediate profits than with the safety and satisfaction of the gas consumer.

Although there was considerable initial hesitation, the scheme has gained the support of nearly all the gas undertakings and the majority of gas appliance makers who now appreciate the assistance which a properly conducted system can render to the reputable makers.

The scheme does not appear to be recognized in any legal or official regulation.

SWITZERLAND.

Origin.

The central organization of the profession of gas and water engineers, Schweizer Verein von Gas- und Wasserfachmännern, has been in existence for a number of years, and has issued a monthly periodical since 1920. At the present its membership is 400, consisting of Italian, French, and German speaking members. A central laboratory was formed in 1930 to deal primarily with problems in the utilization of gas. In the first years the laboratory examined and tested a number of various types of appliances and submitted reports to its members. A variety of general problems were investigated, such as the accuracy of meters, performance of governors, formation of carbon monoxide with cooker hotplates, &c. To prevent overlapping, some of the problems submitted to this organization have been passed for investigation to the Federal Laboratory for testing materials.

The question of a standard series of tests for each type of appliance and the issue of a mark of approval was discussed in 1932 and regulations were drawn up in 1933. These regulations and approval requirements were prepared by a committee of technical representatives of gas undertakings, with members and secretary of the central laboratory. The methods of approval in use in U.S.A., France, and Germany and other countries are examined, and the methods of test as developed in the central laboratory are revised where necessary.

Procedure.

Approval requirements are drawn up by the central laboratory and in co-operation with technical members of the gas undertakings. Requirements have been prepared for instantaneous and storage water heaters, wash boilers, boiling burners, and ovens.

Swiss and foreign manufacturers are allowed to apply for the seal. Foreign firms must apply through a Swiss agent who is prepared to market the appliance in Switzerland, and the seal becomes void if the agent ceases to market the appliance. In order to obtain the seal of approval the manufacturer must submit a description of the appliance, catalogues, drawings, method of use, instructions for fitting, &c., pay the prescribed testing fee, and deliver the sample for testing. Approval is given by a legal document and grants the right to affix a paper label to each appliance which is identical with the standard approved. Manufacturers can advertise that the appliance is stamped and can reproduce the test report. Any

translation must be approved before publication. If the sample appliance is approved it becomes the property of the S.V.G.W. and is kept as a standard sample.

If the appliance is rejected it is returned and the reason for refusal stated. The test fee is not returned, nor is any responsibility taken for damage during test. The S.V.G.W. reserves the right to communicate the reasons for refusal to its gas undertaking members. The issue of the stamp, illustration, and brief description of the appliance is published in the monthly bulletin. The appliance is approved for two years, after which approval is given yearly after inspection. The appliance must conform with the approval requirements in force at the time of yearly approval. Control tests can be carried out on any sample of the appliance at any time to ensure that the standard is being maintained. Any alteration to an approved appliance must be communicated to the S.V.G.W., who will decide whether any re-test is necessary.

The Scheme in Practice.

291 appliances have been examined and tested during the period 1930-1934, the number increasing each year. Last year 92 appliances were tested. The majority of these appliances were examined as the result of inquiries by member gas companies. The introduction of the approval stamp by the S.V.G.W. was at first taken up very slowly by manufacturers; in the first year 19 appliances were submitted and 15 of these received the approval stamp. In contrast to this original indifference on the part of manufacturers, there has been a gratifying increase in the number of appliances submitted for approval stamp owing to its advertising and goodwill value, and it is stated that the stamp will shortly be regularly demanded by consumers.

OTHER COUNTRIES.

The various other countries in which some national system of test of gas appliances has been set up can be dealt with more briefly, if only because in many cases the systems are founded on those in the countries already reviewed.

The United States of America, Great Britain, Germany, and France represent the four most important gas producing countries in the world, mentioning them in the order of their total gas production. Switzerland has been given special attention in this review owing to its international contacts. Although its total gas production is small its production per head of the total population exceeds that of Germany or France though less than that of Holland.

Other countries are considered below in the order of their importance, judging by their total gas production.

(1) *Canada.*

The Canadian policy regarding the testing of gas appliances closely follows that of the United States of America, the Canadian Gas Association being affiliated to the American Gas Association

(2) *Holland.*

In 1928 the Council of the Society of Dutch Gas Manufacturers proposed the formation of the "Gasstichting," an institution especially for examining all technical scientific questions and for testing gas appliances.

The standards to be observed were laid down by the Technical Gas Committee and the Council of the Society of Dutch Gas Manufacturers, the tests being carried out in the laboratories of the "Gasstichting."

The system was supported both by the appliance makers and the gas undertakings, the latter having agreed to sell in their showrooms only gas appliances bearing the approval stamp.

(3) *Japan.*

No official tests operate in Japan although gas undertakings accept a degree of responsibility regarding the appliances they offer to the public, while the Imperial Gas Association, which comprises both undertakings and manufacturers of equipment, encourages the improvement of gas appliances through the medium of prizes.

(4) *Australia and New Zealand.*

Tests have been carried out in Sydney by the Australian Gas Light Company for the New South Wales Commercial Gas Association. The standards to be attained have been determined after consultation with the appliance manufacturers, and a system of badging including the recommended gas rate has been adopted.

A similar but less complete scheme has been in operation in Victoria under the control of the Gas Companies Association, Melbourne.

Operation by State Control, even with a fairly close degree of co-operation, has however been found unsatisfactory, and the formation of a National Gas Association of Australia is proposed under the authority of which a testing and badging scheme to the present standards would come into force. It is hoped that in due course this scheme might also include New Zealand.

(5) *Italy.*

No official systematic method of testing is in force.

(6) *Belgium.*

No system is as yet in operation, but the Belgian Association of Gas Engineers has the matter under active consideration.

The standards to be attained and the control of the tests will be in the hands of the Belgian Gas Association with the assistance of the Association Vincotte which is the laboratory specializing in fuel tests. A system of approval badge is anticipated on the lines of the French A.T.G.

(7) *Austria.*

The Vienna Gas Department has standardized certain tests following the German example, but these appear to be largely unofficial.

(8) *Denmark.*

Official tests are in operation under the control of the Danish Gas Association, the results of which tests are circulated to gas undertakings by the Danskgasteknisk Forening. Appliances carry a certification mark.

(9) *Sweden.*

Tests have been standardized by the Stockholm Gas Department, the standards being laid down by Swenska Gasverksforeningen following German methods. Appliances are marked with a stamp of approval, and it is proposed, when sufficient appliances have been approved, that all non-approved appliances shall be prohibited.

(10) *Poland.*

Tests are carried out in the Laboratorie de l'Usine at Warsaw to standards laid down by the Syndicat Economique Polonais du Gaz et des Eaux.

(11) *Hungary.*

Tests have been standardized and operate under the control of L'Ecole Superieure Technique and L'Institute Technologique. Appliances do not bear a mark of approval, but there is authority to cut off the supply of gas if the appliance is dangerous.

---

(12) *Russia.*

There appear to be no standard methods of test as yet, probably owing to the bad state into which the Gas Industry in Russia has been allowed to lapse. This situation should be corrected now that the Gas Industry is showing pronounced progress in that country.

(13) *Argentine.*

Prior to 1930 most of the gas appliances were imported, the standard of quality being set by appliances of British origin. The crisis of 1930 caused Customs tariffs to be increased and currency values to be depreciated, and manufacture of gas appliances was undertaken in the Argentine with the co-operation of the Primitiva Gas Company of Buenos Aires.

This undertaking carried out tests on appliances and fittings in a way similar to that in operation by certain undertakings in Great Britain. Pressure tests, efficiency tests, combustion tests, and a review of construction are all involved to schedules determined by a committee of the technical staff of the Company.

TECHNICAL STANDARDS.

1. Overseas.

(*a*) Constructional.

The standards in such countries as have adopted them take several forms.

Gasways are tested to pressures varying from 4 in. water gauge (France), to 20 in. water gauge (Germany, Poland,

Sweden, Switzerland) and even higher, *e.g.*, 80 in. water gauge (United States of America).

In certain countries pressure tests are carried out on the water containers and valves, pressures being of the order of 180 lb. per square inch.

Mechanical and chemical tests on components or materials vary widely, and are designed to ensure both initial robustness and resistance in use to corrosion, &c., and to ensure reliable performance. Where specifications have been longest in operation, *e.g.*, United States of America, dimensional details covering air ports, &c., are also enforced.

In certain countries, fire hazard tests are also in operation for cookers and/or space heaters.

(*b*) Thermal Efficiency.

In many countries thermal efficiency tests are in operation covering such appliances as room heaters, water heaters, grillers, and boiling burners, together with tests for heating-up rate and temperature distribution in cooker ovens.

In the United States of America and Sweden actual cooking tests with scones are carried out on cooker ovens.

The minimum thermal efficiencies demanded are, broadly speaking, not less than 30 per cent. radiant efficiency on room heaters, about 70 per cent. on water heaters, and 30-50 per cent. on boiling burners.

(*c*) Hygiene.

General combustion limits are determined in terms of CO-CO_2 ratio in some countries and in terms of CO concentration in the undiluted products of combustion in other countries. There is close correspondence between the two methods of measurement, the limits varying from CO/CO_2 ratio 0·005 to 0·02 for different appliances and different countries. In many countries these limits appear to apply only to normal gas rate, but, in France, storage water heaters are tested at 20 per cent. gas rate overload; in Holland gas fires are tested at 15 per cent. of the normal gas rate; in the United States of America and in Sweden 100 per cent. pressure overload is applied.

In the United States of America combustion is also tested to the same standards with certain appliances burning in a test room in which the products of combustion accumulate, to confirm that the normal concentrations of products in rooms do not prejudice combustion.

In Australia it is proposed that pressure governors should become an integral part of all gas appliances and that the pilots of all multipoint geysers, storage heaters, and ovens should be fitted with thermo cut-offs.

Bafflers, which are sometimes required to be an integral part of certain appliances, are subjected to down blow tests in a number of countries, and there are also regulations regarding the size of heater to which flues must be fitted, *e.g.*, Holland.

In Germany and Poland shadowgraph tests are imposed on gas fires to confirm that the products of combustion all pass up the flue.

2. Great Britain.

There are few appliances which conform to the commonly accepted standard of the larger undertakings or appliance manufacturers which would fail to pass the official tests in other countries, but many appliances fulfilling overseas standards would be considered unacceptable in Great Britain.

While there is no specified constructional standard, the sale or hire of insufficiently robust appliances by the undertakings is uneconomic to the undertakings by reason of subsequent complaints from the public. Personal judgment based on preliminary tests and general experience is considered sufficient to control this factor. In the case of the leading appliance manufacturers, prolonged tests are often carried out under practical conditions before a new design is launched.

There are no hard and fast limits regarding thermal efficiency, but the makers are encouraged to maintain as high an efficiency as possible consistent with safety and facilities for maintenance and with due regard to the first cost of the appliance. Attractive appearance, speed of operation or convenience in use, *e.g.*, pan stability on hotplate, may easily offset some sacrifice in bare thermal efficiency, but inefficient apparatus in the sense of cookers which cannot cook to modern standards or drying cabinets liable to scorch clothes are clearly unacceptable.

In illustration of the progress which has been made during the past 10 or 15 years, thermal efficiency is estimated to have increased, broadly speaking, as follows (comparing the highest efficiency appliances as installed then and now):—

	Per Cent.
Oven	50
Boiling burner (efficiency or rapidity)	25
Grill	50
Hot water set (overall)	50
Fire	25
Wash boiler	40

CO/CO_2 ratio is generally accepted as the criterion for combustion test and on normal gas rate should not exceed about 0·002; at 50 per cent. pressure overload 0·005; and at 100 per cent. pressure overload 0·01. Where governors are fitted to appliances it is not always considered necessary to carry out 100 per cent. pressure overload test.

All gasways are required to be sound at about 3 lb. per square inch and some control is exercised over maximum surface temperature or exposed flames, especially on radiators.

Special tests are devised for bafflers and other items of flue equipment.

REVIEW.

The fact that official or semi-official testing systems for gas appliances have been set up in many countries overseas appears to some a sufficient reason for the setting up of some national system in Great Britain.

Great Britain has led the world in sound appliance design and gas utilization technique. Had the gas industries in other countries been as well served in appliances and technique as we are ourselves at the present time, it is extremely doubtful whether in most cases the testing systems would have been set up. As to the operation of these systems in practice, it is as yet too early to reach any final conclusions; and in any case the relations between gas undertakings and gas appliance manufacturers, and the relations between gas undertakings and the public in other countries, are so different from those in Great Britain that organizations in other countries may form a very misleading precedent.

From time to time Government Committees have made investigations with regard to the safety of gas utilization. These Committees could have reported, if they had thought fit, that an official system for the testing of appliances was desirable and practicable. But none have done so because, in the light of the available evidence, it has been thought preferable to place reliance on the joint efforts of gas undertakings and manufacturers to improve the general technique in respect of the safety and efficiency of gas appliances and to see that all concerned are kept informed of the advances made. In this connection the following recommendation in the report to the Board of Trade of the Departmental Committee on Gas Poisoning, 1930, is relevant.

> "That a central body consisting of representatives of the various branches of the Gas Industry and of representatives of manufacturers of gas pipes, apparatus and fittings should be formed to institute and encourage research into, and to collect information regarding, means of improving the safety and efficiency of the apparatus used in the distribution and supply of gas. The information obtained by this body should be made available, at frequent intervals, for the use of individual gas undertakings and makers of gas apparatus."

This recommendation was followed by the appointment by the Gas Industry of a Central Gas Advisory Board which, reporting progress to the Board of Trade from time to time, has had frequently under review the questions dealt with in this paper.

The gas undertakings in this country are fulfilling to an increasing extent their responsibilities to the public, and the creation of some rigid testing system or procedure might easily reverse this process. That the safety of the public has been recognized as of paramount importance is demonstrated by the fact that the hazards from gas are now statistically negligible. It is extremely doubtful if the operation of the most complete testing organization would of itself further reduce the possibility of accident. An increasing number of undertakings and appliance manufacturers are exercising laboratory and technical control in respect of gas appliance design and installation, not alone from the point of view of safety but in guaranteeing general satisfactory service to the user. This decentralization of technical effort enables varying points of view to find expression but at some sacrifice of opportunity for co-

ordinated technical or scientific co-operation with other industries or national research bodies.

The imposition of any rigid system of test, if it is to be completely effective, necessitates not only the testing of initial samples, but subsequent inspection of production samples, inspection of deliveries, supervision of installation, and even a follow up on maintenance in consumers' houses. These results may not be embodied in the initial system adopted but must inevitably follow any completely logical development of such a system. For economic reasons it would be impossible for all this work to be carried out by qualified skilled personnel, and the use of unskilled personnel requires for its guidance the drafting of somewhat rigid instructions and requirements. The official specifications and testing instructions therefore tend to be more and more detailed, more and more to cramp progress, and ultimately to cause design, under stress of economic competition, to work down to a standard of minimum requirements.

A general agreement on the method of tests and standards to be achieved would present little difficulty, and there would be no serious resistance to the recognition of official bodies for the carrying out of these tests if such a system was clearly desirable. The tests now carried out and the standards now demanded by the undertakings and appliance makers alike are, if anything, in advance of those current in other countries. The technique of the carrying out of these tests is at present under review by a Committee of the British Standards Institution. It remains, however, of the utmost importance that the widest variety of choice of gas appliance be available to the public, each one capable of being recommended for its specific purpose, and a variety in appearance being maintained to give the public a degree of self-expression in choice.

Adoption of an official label or stamp of approval, while it may be intended only to show fulfilment of a minimum standard, tends to convey to the public the impression that all appliances bearing the stamp are of equal merit. If that were so, quality would suffer and the direction of design would tend downwards to a minimum standard rather than upwards to improved performance. An official stamp may also be accepted by the public as an unqualified guarantee, whereas in fact it can only infer that the appliance bearing it will fulfil the required standards when new and properly installed. It does not remove the need for correct installation and adequate maintenance.

The chief value of the stamp appears to lie in the assistance it gives to the smaller undertaking not possessing the means for carrying out tests itself, and for the assistance it gives the fitter in telling him the correct gas rate at which the appliance should operate. Both these requirements can as easily be fulfilled in simpler fashions provided there is—

(1) provision of facilities for small undertakings obtaining test results on appliances from reliable laboratories;

(2) provision of facilities for small appliance manufacturers to have tests carried out on their appliances by reliable laboratories;

Hitherto, the test results obtained by the larger undertakings have been considered more or less confidential, and these laboratories have exercised their discretion as to the appliances which they should accept for test purposes. The distribution of information to all responsible inquirers, and the carrying out of tests on all appliances for all-comers, both raise questions of finance which require to be considered. It must also be borne in mind that the carrying out of tests on a final sample of an appliance does not control the production, especially where the maker is producing small numbers on a non-standardized production basis. It is probable, however, that competitive influences would cause departures from standard to be brought to the notice of the laboratory which had carried out the tests, provided the general policy gained the support of the reputable appliance makers.

The maintenance of a satisfactory standard under practical conditions of use presents a problem which in certain other countries has been dealt with by increasingly rigid specification of constructional details to the prejudice of progress. Some appliances will operate satisfactorily when new but will rapidly deteriorate. The personal judgment of the laboratory personnel concerned would probably be unacceptable to the appliance makers, and would at least throw on that laboratory the onus of a very serious and far-reaching decision in certain cases.

In the case of gas meters, where somewhat similar conditions apply, a system of guarantee by makers for a predetermined number of years is in satisfactory operation.

Safety considerations alone would scarcely justify an extension of the present system or lack of system which has led on the whole to the maintenance of an extremely high standard in this country, a standard of which the British Gas Industry here can feel proud when comparing our appliances, and our technique with that of any other country in the world.

It is necessary, however, to look ahead, and it is clear that the immediate future is to be one of extreme competition between gas and other forms of heat. Any gas appliance in use by the public which fails to give the greatest possible degree of satisfaction is damaging to the prestige of the Gas Industry as a whole. It is therefore a responsibility of the Gas Industry to take every precaution that all gas appliances are operating on consumers' premises in a creditable way, and at the same time to ensure that every encouragement is given to advance in design.

The setting up of independent laboratories by gas undertakings and appliance manufacturers has led to great improvements during the last few years both in appliance design and utilization technique generally, and is a policy to be encouraged as conducive to progress. Encouragement might also be given to a closer degree of co-ordination between these laboratories and to the setting up of some system whereby small manufacturers or small undertakings having inadequate resources themselves for the carrying out of technical tests should be able to seek assistance from those qualified to give it to them.

PROPOSALS.

It is felt that it would add more reality and interest to this paper if specific proposals were put forward for discussion regarding the testing of gas appliances. This matter, however, represents only a single aspect of the organization of utilization technique on a national scale, in the absence of which misunderstandings and waste of technical effort are inevitable. Into a satisfactory organization structure for the whole, the method for dealing with the testing of appliances can easily be introduced. In the past, technique in the Gas Industry almost inevitably represented technique in gas engineering, and the existence of a special technique in gas utilization is only now gradually becoming recognized. Machinery for co-operation on a national scale between personnel or between laboratories engaged on technical utilization problems is almost completely lacking. Whereas in the past attention has chiefly been focussed upon gas engineering problems and the manufacture of gas, there is now a tendency to concentrate attention upon sales methods and sales personnel. Account must be taken, at the same time, of the need for an increasingly high standard of technical knowledge and experience in connection with the choice of appliance, its installation and its maintenance. Whatever the efficiency and competence of the various branches of the Gas Industry may be, it is by satisfactory operation of the gas appliances in the home that the continued prosperity of the Industry will be determined. The sales and installation personnel of the Gas Industry carry a very high degree of individual responsibility in this connection, but the individuals concerned lack corporate feeling and technical recognition on any national scale.

The authors' proposals visualize a form of recognition for those engaged upon gas utilization technique and the creation of a framework organization to facilitate:—

(1) exchange and free discussion of technical information,

(2) co-operation and mutual assistance in research, testing and statistical inquiry,

(3) co-ordination of technical effort where contact is made with other industries or research associations.

Within a suitable framework the co-operation in the testing of gas appliances could readily be achieved without introducing the rigidity associated with excessive centralization.

The only national technical body within the Gas Industry is The Institution of Gas Engineers whose origin and chief concern lie in the technique of gas manufacture, distribution and allied problems. This technique is far removed from that which engages the attention of technical personnel working on gas utilization problems, who would not normally be in any way qualified as Gas Engineers. In the absence of any alternative technical body they have, however, made effective use of and derived benefit from

The Institution of Gas Engineers under the encouragement of which the growing technique of gas utilization could probably best be fostered, at least during the immediate future.

In order to create a corporate feeling and a technical self-respect among utilization personnel, it is suggested that registers or panels of such personnel be created by The Institution of Gas Engineers, it being understood that membership of the panels be in no way conditional upon membership of the Institution itself.

Four registers are proposed, representative of Industrial Domestic, Illumination and Utilization Research technique. The qualifications for registration would require much consideration to ensure an adequate but not too exclusive a standard of technical competence. Membership of the first three registers should be on as broad a basis as possible consistent with some degree of specialized experience in the nominated technique and might easily run into hundreds. Membership of the Utilization Research Register should require definite experience in laboratory research work but should not necessarily be confined to personnel belonging to the Gas Industry. Nomination of individuals as members of Committees dealing with utilization problems could conveniently be confined to personnel whose names were on the appropriate register. The members of each of the four registers should have opportunity to meet at least once a year for general discussions, reading papers, &c.—possibly as sections operating during the meetings of The Institution of Gas Engineers, on the lines of the meetings of the American Gas Association.

The type of decentralized organization which now operates in connection with industrial problems is proposed for the purpose of linking together the personnel in each of the other three specialist panels, so that in addition to an Industrial Technical Committee there would also be a Domestic Technical Committee, an Illumination Technical Committee and a Utilization Research Committee. The first three of these would be constituted on area representation from the several Technical Centres which could be set up on similar lines to the Industrial Centres. In most cases the subscribing undertakings to the Industrial Centre would presumably become subscribing undertakings to the Domestic and Illumination Centres, which could be conveniently under the same control. Each area would thus be self-supporting in utilization technique subject to co-operation and co-ordination with and through the respective Technical Committees on which its representatives would meet representatives of other areas.

The duties of the Technical Committees would be in the direction of technical development, co-ordination of effort and as a channel through which technical information could be distributed through the Area Centres to the subscribing undertakings.

The duties and constitution of the Utilization Research Committee would require different treatment, the membership being based not on area representation—which would be irrelevant—but on the basis of research responsibility or academic distinction. The leading utilization laboratories of the country, the Fuel Department of Leeds University and, possibly, certain research associations outside the Gas Industry could conveniently be represented on the Utilization Research Committee.

The Utilization Research Committee would require to be familiar with all research on gas utilization being carried out inside the Industry and, equally important, should maintain contact with outside bodies carrying out research of value to the Industry. The temptation to attempt to make the Gas Industry entirely self-supporting in terms of its gas utilization research should be specially guarded against—both as being uneconomic and short-sighted. Research workers within the Industry should be experts in gas utilization and, where problems arise involving other considerations, every endeavour should be made to effect co-operation between them and the research workers' expert in this other direction.

Co-ordination of technical abstracting and control of a technical library could conveniently be placed under the Utilization Research Committee.

An important factor in the success of any national scheme would be the ready co-operation of the appliance manufacturers. Co-ordination of effort among the undertakings to the exclusion of the manufacturers would tend to remove any initiative for progress from the manufacturers to the undertakings, which would be a result greatly to be deplored, yet one perhaps inevitably encouraged by the tendency to progressive grouping of the undertakings.

These proposals would not in the first instance involve any financial commitments but would at once lead to considerable economy of effort and a readier distribution of reliable technical information. It is, however, anticipated that in due time the operation of the system would lead to a desire for the appointment of permanent technical officials acting in conjunction with the representative committees, while other financial commitments, such as membership of outside research associations, would also early present themselves.

The record of the Gas Industry in terms of its financial expenditure on development and research in gas utilization has not been one of which it can be proud in comparison with many other industries, with some of which it is in competition. There are few forms of expenditure more fruitful both in direct result and in prestige. In its immediate effect, such co-ordinated technical effort should substantially reduce the annual large sum represented by "complaints." The chief benefit in this and other directions for the most part might not come directly from the distribution of technical information. Men are more important than either machines or organization, and in the long run the Gas Industry must look not to its machines but to its personnel. It is hoped that the creation of the panels of specialists together with the co-ordination of their efforts would lead to the building up of a more competent and better directed enthusiasm within the Gas Industry regarding utilization technique.

The connection between this scheme and the more narrow problem of the testing of gas appliances may not be clear. On the principle that the whole comes before the part, so the outline general scheme should be considered before proposing details covering only a portion of its operation. The testing of gas appliances requires to be organized on the simplest possible basis, and overloading by committees or strangulation by excessive system must be avoided.

The safety aspect of gas appliances is the one of overriding importance, and requires the minimum of specification. Such specifications concerned solely with the safety aspect would presumably be drafted by the Domestic Technical Committee co-operating with the Utilization Research Committee, the specifications, if considered desirable, being distributed under the ægis of the British Standards Institution.

A certification Trade-Mark could be registered—this mark to be in the simplest form, perhaps as a frame containing the approved B.Th.U. rate per hour for safety. The mark would preferably be shown in miniature on the appliance itself and would act solely as a guide in installation and maintenance. This mark should preferably not be used as a selling point since it would have no relation to the capability of the appliance satisfactorily fulfilling its purpose other than merely being safe. Any maker should be entitled to use the mark on his own responsibility, legal action to be taken by the Institution in the event of appliances being sold carrying the mark but incapable of fulfilling the safety specification. An appliance maker not employing a technical staff would therefore be well advised to make arrangements to have tests carried out by arrangement with some competent laboratory.

The exchange of more detailed information regarding efficiency, &c., would be effected via the Domestic Technical Committee, to the Area Centres who would each distribute the information to subscribing members. Such information would cover not only report sheets on appliances but other information regarding general technique. In some cases information would be derived from the research lying within the knowledge of or reported to the Utilization Research Committee who, with the assistance of the Domestic Technical Committee, would interpret the information into a practical and useful form.

The appropriate Committee would also require to collect useful statistical information of a technical kind—more especially regarding the success or otherwise of new appliances or developments in technique. Laboratory tests are devised to forecast practical results and only by continual revision of tests and standards in the light of experience can the testing laboratories exercise their maximum useful effect. Not least of the advantages to be anticipated from a closer and better informed co-operation between undertakings would be a reduction in the demand for a variety of non-standard modifications on appliances designed to be produced to standard pattern. It is because the undertakings rather than the appliance makers have the more intimate and universal contact with the appliances operating in the consumers' houses that the undertakings in this matter must carry the greater share of responsibility.

PROBLEMS AND ANSWERS IN

The Reconstruction of Manufacturing and Distribution Plant at Nottingham

by

GEORGE DIXON, B.Eng., Assoc.M.Inst.C.E.,

Engineer and Manager of the City of Nottingham Gas Department

G. DIXON, B.Eng., Assoc.M.Inst.C.E.

Mr. Dixon served his apprenticeship to general engineering with the Mersey Engine Works Company, Liverpool. From 1905-08 he took an Engineering Course at Liverpool University, and graduated B.Eng. From 1908-10 he was articled to the late Isaac Carr, M.Inst.C.E., Widnes Gas and Water Department, and Consulting Engineer, and for the following two years was Technical Assistant, Gas and Water Department, Widnes. Then he was appointed Chief Assistant to the late J. H. Crowther, Wallasey Gas and Water Department, a post he occupied for seven years. During this period he was elected an Associate Member of the Institution of Civil Engineers. In 1919 he became Engineer and Manager to the Lancaster Corporation Gas Department, and carried out complete re-building and re-organization. In 1932 he was appointed Engineer and Manager to the Nottingham Corporation Gas Department.

Gas was first supplied to Nottingham in 1819 and the original company continued to operate till 1874 when it was transferred to the Corporation which is the present owner. The last Act for the extension of the area of supply is dated 1864, some 10 years previous to the purchase of the Undertaking by the Corporation. The following statistics are given as an indication of the condition of supply to-day:—

Area of supply within city boundary	25	square miles
,, ,, outside ,, ,,	113	,, ,,
Total	138	,, ,,
Gas consumption within city boundary	2,081	Mn. cu.ft. per annum
,, ,, outside ,, ,,	826	,, ,, ,, ,,
Total output from works	2,907	,, ,, ,, ,,
Population within city	283,000	
Total number of consumers	116,000	

Chart 1 shows the statutory area of supply together with the relative position of all works and offices of the Undertaking. Further details of plant, capacity, and position in 1932 are given below.

Basford Manufacturing Station.

Total capacity of carbonizing plant	8½	Mn. cu.ft. per day
48 W.D. vertical retorts built 1916, capacity	4½	,, ,, ,,
30 beds horizontals ,, 1883, ,,	3¾	,, ,, ,,
Auxiliary plant, capacity	6	,, ,, ,,

Eastcroft Manufacturing Station.

Total capacity of carbonizing plant	3	Mn. cu.ft. per day
14 beds horizontals built 1904, capacity	1½	,, ,, ,,
16 beds inclines ,, 1899, ,,	1½	,, ,, ,,
Auxiliary plant, capacity	3	,, ,, ,,

Radford Manufacturing Station.

Total capacity of carbonizing plant	1½	Mn. cu.ft. per day
48 G.W. retorts built 1913, capacity	1½	,, ,, ,,
Auxiliary plant, capacity	1½	,, ,, ,,

General Considerations of Reconstruction.

For some time before the author's appointment as Engineer and Manager the question of reconstruction had been under consideration, but the urgency had been relieved in 1931 by the acceptance of a supply of coke oven gas from the Pinxton Collieries some 11½ miles away.

The necessary plant and main was laid in 1930 and supply commenced on 21st April, 1931. This gave an additional 2 Mn. cu.ft. per day. The gas is purified and metered at the ovens and is tapped into the Nottingham supply mains on its way to the Basford gasholders. The quality is 480 B.Th.U. and both quantity and quality have been satisfactorily maintained by the suppliers without interruption.

As the maximum day's output in 1932 was 10,618,000 cu.ft. it will be noted that the plant capacity was ample although the horizontal retorts at Basford and Eastcroft were very uneconomical and subject to all the disadvantages of manufacturing 475 B.Th.U. straight coal gas.

The manufacturing costs at the three stations of the Nottingham Corporation Gas Department for year ending 31st March, 1932, are given in Table 1.

A careful preliminary survey of all plants made it obvious that considerable reconstruction would have to be undertaken at an early date.

CHART 1.—*The Statutory Area of Supply of the Nottingham Gas Department and the Relative Positions of all Works and Offices.*

Fortunately the financial position of the Undertaking had been carefully nursed over a number of years and the total capital expenditure at the 31st March, 1932, was £1,664,165; £935,000 had been repaid leaving a balance of

TABLE 1.—*Manufacturing Costs at the Three Stations, Basford, Eastcroft, and Radford, of the Nottingham Corporation Gas Department, year ending 31st March, 1932.*

	Basford.		Eastcroft.		Radford.	
	Per Ton.	Per 1,000 Cu.Ft.	Per Ton.	Per 1,000 Cu Ft.	Per Ton.	Per 1,000 Cu.Ft.
	s. d.	s. d.	s. d.	s. d.	s. d.	s. d.
Coal and handling	17 2·10	1 2·06	18 6·03	1 4·19	16 8·20	1 2·76
Carbonizing wages	1 1·61	0 0·93	2 8·53	0 2·37	1 3·32	0 1·13
Gas stores and sundries	0 2·36	0 0·16	0 4·51	0 0·33	0 2·84	0 0·21
Purification	0 6·90	0 0·47	0 6·90	0 0·50	0 5·34	0 0·39
Repairs to works	2 7·09	0 2·12	5 1·81	0 4·51	2 2·31	0 1·94
Boilers and power	0 9·52	0 0·65	0 9·52	0 0·69	0 6·35	0 0·47
Salaries and wages	1 7·88	0 1·35	2 1·04	0 1·87	1 7·49	0 1·44
	24 1·46	1 7·74	30 2·94	2 2·46	22 11·85	1 8·34
Less residuals	11 4·52	0 9·31	11 8·79	0 10·26	12 1·42	0 10·72
Net cost into holder	12 8·94	0 10·43	18 6·15	1 4·20	10 10·43	0 9·62

£729,000. There were funds in hand amounting to £907,000.

Distribution.

The Distribution costs for year ending 31st March, 1932, were:—

	d.	
Mains and services	1·54	per 1,000 cu.ft.
Meters	2·63	,, ,,
Stoves, &c.	2·31	,, ,,
Buildings and plant	0·03	,, ,,
Salaries and wages	1.00	,, ,,
Meter collection	0·30	,, ,,
Miscellaneous	0·10	,, ,,
	7·91	,, ,,
Less stove and meter rents	2·08	,, ,,
	5·83	,, ,,

Whilst it was realized that modern service demands made it unlikely that these figures could be reduced in total, it was expected that reorganization of the Distribution Department would enable us to save money which could be utilized for the introduction of Consumers' Maintenance and Special Service Sections which were very urgently needed.

Owing to the movement of population from the City to new outside districts, mains problems were acute and pressure variations proved a serious drawback.

The remedy was obvious but costly, and the difficulty of finding room for new mains in the already overcrowded city streets was almost insurmountable.

Pressure surveys showed the necessity of immediately increasing works governor pressures for all load periods and this was done although it has proved very costly, the unaccounted for figures rising from 5·32 per cent. in 1932 to 8·67 per cent. in 1935.

This leakage figure represents a sum of approximately £8,000 per annum and if only one half is saved by a reorganization of the mains system it will be sufficient to pay interest and redemption on a capital sum of £50,000.

Although a start has been made upon this work, much still remains to be done, partly because of the pressure of other reconstruction work and partly because of the fact that it is hoped to take advantage of the making of a new arterial road round the City which we may use for the route of our new ring main.

Considerable trouble was being experienced by the Mains and Services Department owing to the presence of naphthalene and water stoppages and an immediate step was therefore taken by putting down a dri-gas plant at the Basford Works and temporary naphthalene washers on the horizontal gas streams at both Basford and Eastcroft Works. As these plants will not be referred to again it is worthy of note that the results obtained follow those of other undertakings—the troubles after a period of 12 months having almost entirely disappeared. Chart 2 indicates the decrease in the number of complaints.

Syphon pumping on the district is now done each half year only and is proving a means of detecting leakages by the infiltration of water from surrounding ground.

COKE OVEN GAS SUPPLIES.

Coke ovens require to produce cheap coke which is an important factor in the production of cheap iron and steel. They use washed slack coal which could otherwise be disposed of only with difficulty. Gas Undertakings are interested mainly in the supply of cheap gas both for domestic consumers and for industrial purposes.

If, by taking a supply of coke oven gas, a gas undertaking can offer cheaper gas within its area, an extension of its use will almost inevitably take place and the following general advantages will accrue:—

(1) Cost of coke production at coke ovens, and therefore cost of iron and steel production, cheapens.
(2) More gas is used by householders, with lighter work for housewife and reduction of smoke nuisance.
(3) Cheaper and better industrial operation is enabled through more efficient use of fuel, better quality of products, and less spoiling of materials.

Against these advantages must be set the following:—

(*a*) Less coal is used at gas works and therefore there is loss of revenue by railways.
(*b*) Normal gas works labour is displaced.
(*c*) Reduction in tar production results as coal is displaced and it is necessary to import tar products for road works and other purposes.

Moreover gas works not only produce gas but smokeless fuel in the form of coke. To the extent that gas undertakings supply coke oven gas, coke oven coke would have

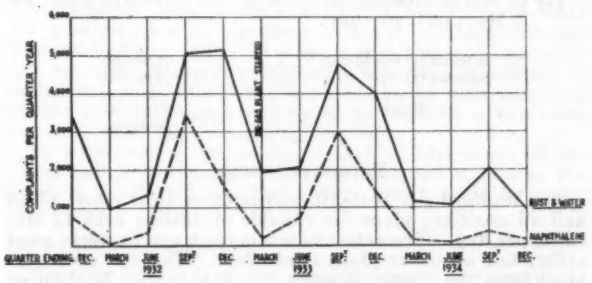


CHART 2.—*Showing the Decrease in the Number of Complaints after Putting Down Dri-Gas Plant at Basford and Temporary Naphthalene Washers at Basford and Eastcroft.*

to be imported to replace the shortage of gas coke and this would to some extent offset the loss of revenue of the railway companies.

The economic possibility of a coke oven supply was discussed with several collieries at a distance of 25 miles from Nottingham but little headway was made, because the difference between the winter and summer requirements of the gas undertaking was not acceptable to the suppliers; moreover the collieries were not disposed to come to a decision in time to give us a supply for the winter of 1934, which was the limit that could be allowed if we were to safeguard our district requirements.

What the future holds in the matter is not known, but preliminary investigations lead to the conclusion that some form of gas grid for an area round Nottingham may be an economic possibility both from the national and local viewpoint. It is not considered that the risk of failure of coke oven supplies is greater than the risk of a similar failure from gas works, but that the attitude of the Industry with regard to security of supply from coke ovens will materially alter as further experience is gained of existing supplies.

I wish to express my indebtedness to those members of my staff who have given me the necessary assistance in the preparation of this Paper. It is the result of team

work, and it would be invidious for me to single out any particular member.

CARBONIZING PLANT RECONSTRUCTION.

As the horizontal and inclined plants at Basford and Eastcroft were recognized as uneconomic and obsolete, the safe carbonizing plant capacity was:—

Basford verticals	4½ Mn. cu.ft. per day
Radford verticals	1½ ,, ,, ,,
Coke oven supply	2 ,, ,, ,,
Total	8 ,, ,, ,,

and it was therefore necessary to design schemes to give us an additional 3 Mn. cu.ft. per day to meet our maximum requirements.

Basford Scheme.

The advantages of the Basford site were:—

(1) the ample area of site;
(2) the main shops and stores are at this Works;
(3) the Tar and Sulphate Plants are at hand;
(4) the overhead charges would be lessened by concentrating all manufacturing at this Works.

The difficulties were:—

(*a*) the site is served by one Railway only;
(*b*) sidings are small for all traffic;
(*c*) all exhausting, condensing, washing and purifying plants and station meters are of 6 Mn. cu.ft. capacity only;
(*d*) outlet mains are insufficient;
(*e*) the works are inconveniently situated for coke distribution to southern part of area;
(*f*) the cost of laying inter-works mains and pumping all gas for supplying southern area.

Two schemes were estimated:—

(1) to rebuild the existing vertical retort bench, increasing the capacity to the full capacity of all auxiliary plant, 6 Mn. cu.ft. per day;
(2) to add additional carbonizing and auxiliary plant for 3 Mn. cu.ft. per day.

Scheme (1) would cost	£60,000
Scheme (2) ,, ,,	£70,000
Total	£130,000

Radford Scheme.

The Radford site is small, and both vertical retort plant and all auxiliary plant are capable of dealing with 1½ Mn. cu.ft. per day. The retort bench is reset and in fairly good order, but all other plant is obsolete. The gas area supplied from the Works is much less than either Basford or Eastcroft, and the requirements could be fairly easily met from the other Works without pumping. The site is becoming very closely hemmed in by good housing schemes and the risk of nuisance is important.

The only possible scheme would be to rebuild the whole works for a capacity of 3 Mn. cu.ft. per day at a cost of £75,000 and to reset the Basford vertical bench with increased capacity to 6 Mn. cu.ft. at a cost of £60,000, giving a total expenditure of £135,000.

Eastcroft Scheme.

To develop the Eastcroft Station appeared to be advantageous for the following reasons:—

(1) it serves a large growing district south of the river;
(2) it is close to the centre of the City and there is a large local coke demand;
(3) all the auxiliary plant is of 3 Mn. cu.ft. per day capacity and is in serviceable condition;
(4) there are ample mains for gas distribution to meet south requirements;
(5) holder capacity amounts to 2½ Mn. cu.ft.;
(6) the sidings are connected to a railway system different from those at Basford.

The Eastcroft Works had been closed down because:—

(*a*) the horizontal and inclined retort benches were obsolete;
(*b*) the costs of manufacture were uneconomic;
(*c*) the site as laid out was cramped;
(*d*) there was no room for coke storage;
(*e*) all traffic had to be handled over turntables by horses;
(*f*) the nuisance created by coke quenching;
(*g*) all tar and liquor had to be transported to Basford for distillation.

The preliminary consideration of the possibility of re-using this station led us to the decision that the reasons for closing down were fairly easy to dispose of, as it was possible to design reconstruction to accommodate a 3 Mn. cu.ft. plant, leaving ample room for coke storage and a satisfactory loop siding in and out of the Works.

It was, therefore, decided to concentrate on further consideration to this site as having the most favourable possibilities, the scheme to be in addition to the reconstruction of Basford vertical plant to give a full 6 Mn. cu.ft. per day capacity.

The total scheme was estimated as follows:—

Basford scheme, increasing to 6 Mn. cu ft. per day	£60,000
Eastcroft, 3 Mn. cu.ft. per day	£75,000
Total	£135,000

CHOICE OF PLANT.

In order to assess the merits of each scheme, attention was now focussed upon local conditions of coal, coke, water, &c.

Coals.

Nottingham is situated just south of fairly extensive Notts. and Derby coal fields. Consideration was given as to whether it was economic to continue to use similar coals, or to change over to the better Yorkshire fields at the necessary increased costs but rather better yields of gas.

The Midland coal, although it produces 6½ therms per ton less gas, actually gives an appreciably lower net coal cost per therm of gas made, and seeing that the labour and capital charges are constant, the Midland coal gives us a lower net cost of gas into the holder.

Coke.

Nottingham has enjoyed an excellent name for coke which is very suitable for both domestic and industrial purposes. It is of very porous texture and possesses "free burning and easily ignitable" characteristics due to the class of coal carbonized.

An independent authority on coke describes it as follows:—

> "The fuel is quite suitable for use in open grates. It lights readily, and quickly reaches the necessary temperature. The coke is above the usual standard of quality as regards ignitability and combustibility."

The average analysis is:—

	Per Cent.
Moisture	6·26
Ash	6·99
Free carbon	84·21
Volatile	2·54
	100·00

The financial return from coke represents 48 per cent. of the cost of the coal into bunkers so that it was desirable that the choice of carbonizing plant should be such as would enable this market to be retained.

Quality of Gas.

The declared calorific value in gas is 475 B.Th.U.

Plant to operate at 100 per cent. load.

The fact that the proposed plant is to work at full capacity all the year round has been taken into consideration throughout.

Position of Works.

Great importance was attached to the absence of nuisance, whichever Works was chosen for the new plant. At Basford the area is rapidly becoming hemmed in by residential property, whereas Eastcroft is in the centre of the industrial side of the City but closed in by important clean trades on all sides.

Area of site.

The Basford site presented no difficulties with regard to available area, but Eastcroft is exceedingly limited and

the capacity of plant per unit area was, therefore, of greatest importance.

Probably the best known information on this question of ground space is to be found in Mr. T. Hardie's Presidential Address to the Southern Association of Gas Engineers and Managers, 1927, in which he gave the following comparative figures of the cubic feet of gas made per 24 hours per square foot of retort house site:—

Inclined retorts	212·8
Horizontal retorts	267·1
Continuous vertical retorts	531·2

It is interesting to note that since Mr. Hardie's Address further progress has been made with large section retorts, and in the case of Eastcroft, even though there are two separate benches of vertical retorts, a plant with a capacity of 3½ Mn. cu.ft. of gas per day is obtained on a plan area of 4,126 sq. ft., giving an output of 800 cu.ft. per square foot of ground space.

Available water.

Both Basford and Eastcroft sites are similarly placed as both town and well water are available. Eastcroft has also a railway-owned canal alongside.

Capital Costs of Horizontal and Vertical Retorts.

Comparative capital costs are somewhat difficult to obtain, but interesting figures are given by Mr. R. W. Hunter in his Paper, "The Coke Oven Plant at Beckton Gas Works," Communication No. 68, presented at the 70th Annual General Meeting of The Institution of Gas Engineers, 1933. Mr. Hunter gave the following comparative figures for the capital cost of various types of carbonizing plant:—

Capital Cost per Ton of Coal Carbonized per Day.

Coke ovens	£279
Intermittent verticals	£262
Horizontals	£260
Continuous verticals	£249

These figures appear to show that from a capital cost point of view continuous verticals are in a favourable position, and it will be noted from the section on costs, submitted in this Paper at a later stage, that the capital costs of the carbonizing plant, including waste heat boilers, at Eastcroft worked out at £273 per ton, this figure including the provision of the retort house of modern design and ample area.

Decisions.

All schemes were now closely assessed on all considerations and it was finally decided

(1) to reconstruct the Eastcroft Works with a 3 Mn. cu.ft. per day continuous vertical retort plant;
(2) to rebuild the Basford vertical retort plant and increase the capacity to 6 Mn. cu.ft. per day;
(3) to close down the Radford Station.

CONSIDERATIONS IN DESIGN OF EASTCROFT VERTICAL INSTALLATION.

Retort House.

The author considers that the "standard" type of steel framed building with brick filling is long out of date, and an effort was made to get away from this in order to give a more pleasing effect, so as to harmonize with surrounding factories and offices and to give some inducement to those responsible for the upkeep of the Works to have some pride in it.

Area of House.

The largest possible size of house was specified having regard to the rather limited site, so that employees could work in reasonable comfort. Very ample ventilation and natural light were also arranged.

Waste Heat Boilers.

A separate house was specified for the waste heat boilers, feed pumps, and extractor engines. Moderate tiling on floors and walls was included so that all plant could be kept clean from the usual retort house dust.

Generator House.

It was arranged to treat the electric generator house in a similar way to the waste heat boiler house.

Chimney.

On non-recuperative settings, in which at times the waste heat boiler is by-passed, the temperature of the gases at the stack inlet may reach 700°-800° C. It was decided, therefore, to provide for a steel chimney lined with firebrick as being more suitable than an all-brick stack, being better able to withstand the temperature conditions.

There is, moreover, considerable saving in capital cost amounting to as much as 25 per cent. where the stack does not start from the ground.

Coal Breaker.

The coal breaker was designed to be placed above ground and housed in to prevent dust nuisance and afford ready access for inspection and maintenance.

Covered Plant.

The importance of keeping down all nuisance led us to a decision to specify all plant and coke screens to be entirely housed in.

Full Capacities.

In order to keep down maintenance costs, all pumps, extractor engines, fan engines, motors, coal and coke plant were specified to be of very ample capacity.

Railway Sidings.

A direct railway siding with easy curves and a loop line for in and out traffic, doing away with the existing turntables, was designed quite satisfactorily.

Division of Settings.

Stress was laid upon the necessity for dividing the bench into two independent sections so as to enable us to reset one half without interfering with the working of the other.

Producers.

External producers were favoured and specified of large size, so as to enable breeze to be burnt, and also to provide excess producer gas to augment the waste heat to the boilers if and when necessary.

Coke Plant.

Coke screening plants have had the attention of all Gas Engineers for a very long time, and whilst the types of plant on the market are legion, there remains always a choice of evils.

Nottingham coke because of its friable nature requires the greatest care in handling. Many standard schemes were carefully considered but none met with our approval, and we were ultimately attracted with the possibility of the rubber belt "Undulo" type combined with vibrating scalper and debreezing screens so as to allow a minimum quantity to be fed over the rubber belt.

As a precaution and owing to lack of experience of the life of such a screen, the house was designed so that in the event of a failure a standard shaker screen could be easily substituted.

Outlet Debreezing Screens.

The coke outlets from the storage hoppers were provided with vibrating screens to remove such breeze as was formed by the fall of the coke into the bunkers or its passage down to the hopper outlets. Automatic bagging and weighing machines were also included.

Condensers.

A double set of water tube condensers and a cyclone tar extractor completed the contract.

Stores, Workshops, &c.

The scheme also provided for the demolition of all old buildings and plant or their utilization as shops, stores, messrooms, &c., so as to avoid the unsightly appearance of derelict buildings on the rather restricted site.

Water.

It was decided,

(1) to use town water for boilers and condensers,
(2) to instal a water softening and treatment plant for the whole of the water,
(3) to pass the waste heat boiler water through one condenser,
(4) to put in a water circulating and cooling system,
(5) to use well water for coke quenching and producer grates.

Waste Heat Utilization.

Calculation from the fuel consumption to be expected on the producers led us to design for two waste heat boilers, each of a capacity of 6,000 lb. steam per hour.

Of this 12,000 lb. per hour total steam, it was estimated that 5,000 lb. per hour would be required for steaming re-

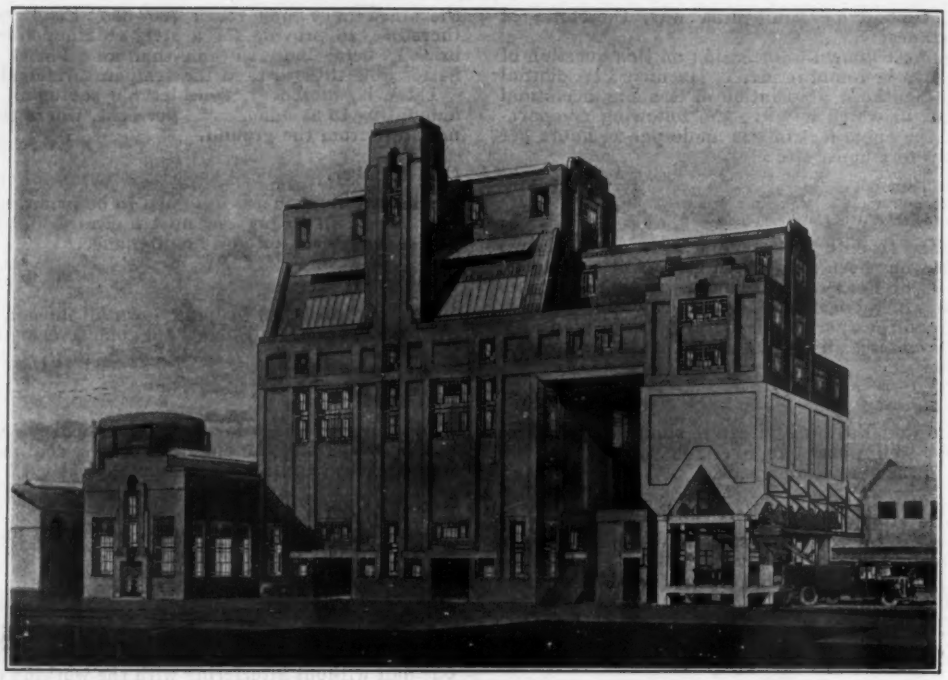


FIGURE 1.—*Eastcroft Gas Works, 1934; View from Railway Siding—Design Drawing.*

torts and producers on maximum load, leaving a balance of 7,000 lb. per hour for general works purposes. It was, therefore, decided to put in a duplicate set of steam driven electric generators each of a capacity of 100 K.W. in order to give ample requirements for the electric drives of the carbonizing plant and to leave a margin for the fitting shop and general yard lighting.

Electric Generating Plant.

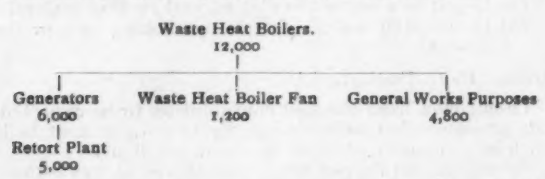
Enquiries with regard to the performance of back-pressure engines acting against 25 lb. per square inch produced the following interesting figures:—

—	Steam Consumption.		
	Full Load.	¾ Load.	½ Load.
1	2	3	4
Pounds per KW.-hour against 25 lb. back pressure	70·5	80·0	95·0
Pounds per KW.-hour atmospheric exhaust	47·5	55·0	61·0

—	Steam Consumption.	
	Against 25 lb.	Atmospheric.
1	2	3
With all plant at work—75 KW.	6,000	4,125
Steam for retorts and producers	(Included)	5,000
Total steam	6,000	9,125

It was clear from the foregoing figures that with an engine exhausting against a back pressure of 25 lb. that there would be a saving of 3,000 lb. of steam per hour, and as the additional cost of the larger piping and the necessary relief valve was only £309 it was obviously in our interests to instal the back pressure engines and use the exhaust steam for steaming the retorts.

The estimated steam position was, therefore:—



If such figures could be obtained it would be possible to shut down the existing Lancashire boilers; and the back pressure engines were therefore specified and installed.

DESCRIPTION OF PLANT.

RETORT HOUSE.

There is always a difficulty in housing the somewhat unusual shapes and requirements associated with a gas making plant. It is not easy to express character and efficiency, and to produce a design that does not offensively clash with the surroundings.

It is obvious that each problem has to be treated on its merits and much careful thought has been given to the design, construction, lighting, and ventilation of the Eastcroft building. With the absolute minimum of materials, and by economic construction, a building possessing an air of distinction and a dignity of line has been attained by the simple pier and panel effect, and by balance of voids to wall space. Figure 1, a design drawing of the Works from the railway siding, and Figure 2, a photograph showing the coke bunkers and screen house, illustrate this achievement.

The extra cost of the embellished house as erected amounted to £950, and represents just over 1 per cent. on the cost of the whole reconstruction, and the money is considered well spent.

CARBONIZING PLANT.

The plant consists of 18 103-in. Woodall-Duckham vertical retorts upwardly heated and arranged in two independently controlled units of 10 and 8 retorts respectively. With all retorts in action the plant is capable of making 3¼ Mn. cu.ft. of 475 B.Th.U. gas per 24 hours.

The object of the division into two separate benches is so that repairs can be effected to the one section without affecting the working of the other.

A criticism which might be levelled at this arrangement is that the fuel consumption might be unnecessarily high, but actually the fuel consumption has been found to be very low. This is probably accounted for by two facts in the setting design, the provision of end and front walls of adequate thickness and high insulating properties, coupled with the use of large carbonizing units which expose less external surface of the setting per ton of coal carbonized than do smaller units.

SETTING INSULATION.

The setting front is insulated by means of high efficiency insulating brick incorporated into the front wall of the setting. This appears to us to be an advantage over the

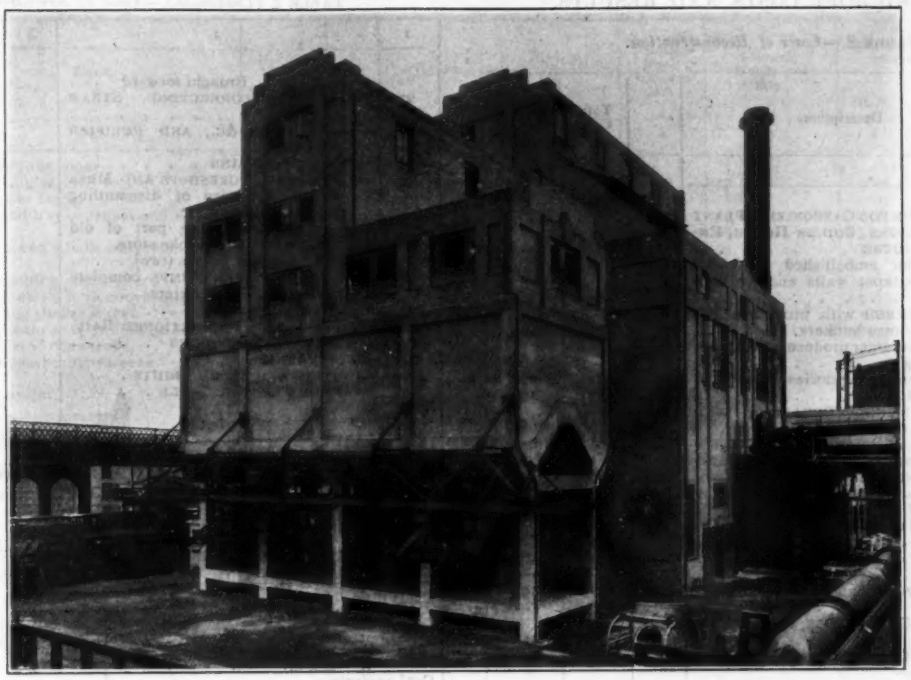


FIGURE 2.—*Eastcroft Gas Works, November, 1934; View Showing Coke Bunkers and Screen House.*

procedure of applying an insulating lagging to the outside of the setting. From a heat loss point of view there is little to choose between the two methods, but the system of incorporating the insulation in the setting front wall has the advantages that when the setting is heated up or cooled down the heat insulation materials remain an integral part of the setting and any contraction cracks which occur can easily be pointed. There is always the tendency, when cooling down a setting covered with applied lagging, for a gap to appear between the lagging and the cooled setting, and thus the lagging is less effective when the plant is heated up again.

VENTILATION OF TOP CHARGING PLATFORM.

The top charging platform has been laid out to give comfortable working conditions, by the elimination of as much heat as possible and by providing free ventilation.

COKE QUENCHING.

The discharge of dry cool coke is effected by the standard Woodall-Duckham Coke Discharger in which the coke can be quenched by steam or water or a combination of both.

PRODUCERS.

The producers are in two separate blocks at ground level and the gas from each producer is fed into a trunk main from which the gas is delivered to either setting, a separate connection being provided to supply the gas to each pair of retorts. As the producers are inter-connected in this manner, any one can be relined or shut down for inspection without interfering with the operation of adjacent retorts. Further, by reason of this interconnection of the producers through the trunk producer gas main, a constant pressure of producer gas is maintained at the settings during fire cleaning of individual producers. The producers themselves are of the step-grate type, of ample area to provide for breeze burning, without the formation of excessive clinker.

The total grate area is 272 sq. ft. and the specification allows for as much as 40 per cent. of the fuel burnt to be breeze.

WASTE HEAT BOILER PLANT.

Two waste heat boilers have been provided and these are placed in a separate boiler house.

They are of the horizontal, multi-tubular, fire tube type, each of 6,000 lb. per hour capacity, and are designed for a working pressure of 120 lb. per square inch. Each boiler is provided with thermo-feed water regulators of the Ronald Trist type.

AUGMENTATION.

In order that the steam output of the waste heat boiler plant may be maintained, irrespective of the number of retorts working, arrangements have been made for a supplementary supply of producer gas to be introduced, mixed and burnt with the waste gases from the retort benches before the waste gases pass through the boilers.

COKE SCREENING AND STORAGE PLANT.

Coke from one or other of the two gravity bucket conveyors passes on to a Gyrex screen which separates the coke into two sections above 2 in. and below 2 in. The material above 2 in. either passes direct into the "large coke" bunker, into which it descends by means of an open spiral to prevent breakage, or, if required, through a coke breaker. The material through 2 in., together with the coke through the breaker, then passes over a second Gyrex screen to remove into the breeze bunker all through $\frac{1}{2}$ in. The oversize from this screen then passes on to an Undulo screen which grades and distributes the coke into three sizes: bean coke, $\frac{1}{2}$ in.-$\frac{3}{4}$ in.; boiler nuts, $\frac{3}{4}$ in.-$1\frac{1}{4}$ in.; and broken coke, $1\frac{1}{4}$ in.-2 in.

The Undulo screen is a recent development of the Woodall-Duckham Companies. Amongst the attractive features of this screen are the small amount of breeze formed in screening, the lower power requirements, and the absence of vibration noise.

LABOUR.

The labour on the Eastcroft plant is as follows:—

Shiftmen	1 chargehand.
	2 topmen.
	2 coke discharger and producer men.
	1 machine man.
Daymen	2 coal men.
	1 sealpot man and cleaner.
	2 coke bunker attendants.
	1 general cleaner.

A six shift-week is in operation.

VII EASTCROFT COSTS AND RESULTS.

TABLE 2.—*Costs of Reconstruction.*

Item.	Description.		Total Cost.	Cost per Mn. Cu.Ft. per Day.
1	2	3	4	5
			£	£
1	FOUNDATION FOR CARBONIZING PLANT		2,770	923
2	RETORT HOUSE, BOILER HOUSE, ENGINE HOUSE		4,532	1,511
	EXTRA for embellished brickwork with parapet walls and Trafford tiles		950	316
3	RETORT BENCH with producers and steel storage bunkers		26,818	8,939
	EXTRA for larger producers for breeze burning		507	169
4	MESS ROOM and lavatories		895	298
5	CONTROL ROOM		323	108
6	COAL TIPPING, BREAKING, AND ELEVATING PLANT		7,865	2,622
7	WASTE HEAT BOILER PLANT		3,690	1,230
8	COKE BUNKERS, SCREENING, AND CUTTING PLANT, including mechanical debreezing screens		6,215	2,072
9	ELECTRIC LIFT		960	320
10	WATER TUBE CONDENSERS with valves and connections		1,553	518
11	CYCLONE TAR EXTRACTOR		495	165
	TOTAL FOR CARBONIZING PLANT		57,573	19,191
12	ELECTRIC GENERATORS, two 100 KW. sets		2,872	957
13	WATER CIRCULATING AND COOLING PLANT—			
	Softening plant, approx.	450		
	Cooling tower, ,,	300		
	Pump house, ,,	95		
	Pumps, motors, starters, and wiring	413		
	Water tanks and support steelwork	465		
	Foundations	410		
	Pipework	285		
	Total	2,418	2,418	806
14	FOUL GAS MAIN—			
	Steel pipe and fixing	169		
	C.I. pipe and laying	115		
	Total	284	284	95
15	NEW STEAM LOCOMOTIVE		1,122	374
16	SHED AND PIT FOR NEW STEAM LOCOMOTIVE		276	92
17	DRAINS		642	214
18	PLUMBING AND SOIL PIPES		98	33
19	ROADWAYS ANE PAVING		1,645	548
20	DRI-GAS PLANT AND BUILDING		1,818	606
21	CONNERSVILLE EXHAUSTER		597	199
	Carried forward	£	69,345	23,115

TABLE 2 (*Continued*).—*Costs of Reconstruction.*

1	2	3	4	5
			£	£
	Brought forward		69,345	23,115
22	NEW INTER-CONNECTING STEAM MAINS		302	101
23	GAS HEATER, &C., AND PURIFIER REPAIRS		355	118
24	CONNECTING MAINS		852	284
25	NEW STORES, WORKSHOPS AND MESS ROOM, exclusive of dismantling retorts, chimney, &c.		4,831	1,610
26	CONVERTING remaining part of old incline house into coke store		477	159
27	TAR AND LIQUOR PUMPS (two)		130	43
28	TWO WELL-WATER PUMPS complete with motors and starters		133	45
29	RAILWAY SIDINGS		1,302	434
30	TWO 40 TONS RE-CONDITIONED RAILWAY WEIGH-BRIDGES		494	164
31	SUNDRY ITEMS		1,150	383
32	LIGHTING AND FLOOD LIGHTS		472	158
33	STANDBY ELECTRIC CABLE		99	33
	TOTAL	£	79,942	26,647

TABLE 3.—*Test Results and Guarantees.*

All gas yields and calorific values corrected to 60° F. and 30 in. Hg. wet.

—	Results.	Guarantees.
1	2	3
Coals used—		
Derbyshire nuts, per cent.	67·2	74
,, R-o-M. ,,	12·4	12
Yorkshire nuts ,,	12·9	8
,, R-o-M. ,,	7·5	6
Coal analysis—		
Volatile matter content, per cent.	34·1	35·7
Moisture content ,,	7·5	2
Ash content ,,	6·1	6
Coke analysis—		
Moisture in coke fuel, per cent.	8·3	*Nil*
Gross calorific value of gas: B.Th.U./cu.ft.	477	475
Throughput per retort per 24 hours, tons	10·56	10·5
Total throughput per 24 hours, tons	190·0	189·0
Make of gas per ton of coal as charged, cu.ft.	17,630	..
Make of gas per ton of coal as charged, therms	84·1	..
Make of gas per ton of coal with 8 per cent. ash and moisture, cu.ft.	18,770	16,610
Make of gas per ton of coal with 8 per cent. ash and moisture, therms	89·56	78·9
Total make of gas per 24 hours, cu.ft.	3,350,000	3,139,000
,, ,, ,, ,, therms	15,980	14,910
Wet fuel consumption, per cent.	12·2	..
Dry ,, ,, ,,	11·2	13·75
Steam generated per hour, lb.	7,900	12,000
Steam generated per lb. of dry coke, lb.	3·98	4·6

NOTE.—The low figure for the steam raised per hour during the test is accounted for by:—

(*a*) The low fuel consumption per ton of coal carbonized, coupled with

(*b*) The high thermal yield per ton of coal carbonized.

The fuel consumption per therm of gas equals 2·983 lb. of dry coke as compared with the guarantee of 3·904 lb.

TABLE 4.—*Producer Operation, Test Results.*

1	2
Total grate area	272 sq.ft.
Wet fuel used per hour	2,166 lb.
Wet fuel used per square foot per hour	7·96 lb.
Average moisture content of fuel	8·28 per cent.
Dry fuel used per square foot per hour	7·30 lb.
Calculated high pressure steam used per hour	780 lb.
,, low ,, ,, ,,	648 lb.
Total steam used per lb. of wet fuel	0·66 lb.
,, ,, ,, dry ,,	0·72 lb.
Percentage of added breeze below ¼ in. mesh in average fuel used by weight	32·4 per cent.

TABLE 5.—*Steam Balance.*

Steam Made per Hour.		Consumption per Hour	
1	2	3	4
	Lb.		Lb.
Waste heat boiler allowing 5 per cent. "blow-down"	7,500	Electric generators	3,430
Lancashire boilers	750	Producers	780
		W.H. boiler turbine	650
		Feed water and liquor pumps	500
		Gas exhauster	560
		General heating	800
		Rotary washer and dri-gas plant	650
		Yard pumps	350
		Condensation and small consumption, &c.	530
Total	8,250		8,250

Exhaust Steam.		Calculated.	
	Lb.		Lb.
Available per hour from generators	3,430	Used in retorts	2,880
		Used in producers	648
Total	3,430*		3,528*

* Difference ignored as margin of error.

Average steam used on generators per hour . 3,433 lb.
Average K.W.H. generated per hour . . 28·2
Average steam consumption per K.W.H. . . 121·7 lb.

RECONSTRUCTION OF DISTRIBUTION SHOPS.

The whole of the distribution shops, stores, and offices are housed in a large three-storey building situated in Woodborough Road in a fairly central position in the City.

In common with all other undertakings, Nottingham was feeling the urgent necessity of much better service to the ever increasing number of consumers and the ever important demand for modern appliances.

The rapid development of housing schemes further and further removed from the centre of the City caused an amount of work that outgrew the possibilities of the existing staff and organization, and arrears of work had become serious. Requirements had apparently outgrown the size of the premises, and many schemes were considered for removal to another site. These schemes, however, were not found practicable within economic limits, and eventu-

TABLE 6.—*Power Plant.*

Plant.	H.P. of Motor. 440 Volts.	Duty Performed.	Tonnage Dealt with per Day.	Kilowatt Hours per Day.	Maximum Load on Motor. H.P.	Maximum Load on Motor. KW.
1	2	3	4	5	6	7
Coal handling plant—						
Coal tippler	15	Unloading 16 ton wagons	180	17·9	11·80	8·80
Drag bar feeder	5	Feeding coal to breaker and elevator	180	8·0	2·95	2·20
Inclined tray conveyor and breaker	24	Breaking and elevating large coal	50	15·0 = 109·6	8·85	6·60
		Elevating nuts	130	29·1	7·08	5·28
Nos. 1 and 2 L.B. conveyors	15 each	Elevating coal	180	39·6	7·08	5·28
Coke handling plant—						
Nos. 1 and 2 L.B. conveyors	15 each	Elevating coke	96	15·94	5·90	4·40
Scalping shaker screen	5	Screening large coke	96	5·66	3·54	2·64
2nd shaker and Undulo screens	5	Grading coke	58	10·44 = 34·40	5·01	3·74
Coke band conveyor	5	Loading into wagons	38	0·46	2·06	1·54
4 ace debreezing screens	⅝ each	Taking out breeze when loading into wagons or vehicles		1·90	0·497	0·37
Coke cutter	8				5·31	3·96
Water pumps—						
2 to No. 1 condenser	8 each	Circulating cooler to condensers		110·4	6·17	4·60
2 ,, 2 ,,	1·5 each	Water for waste heat boiler		21·6 = 191·0	1·21	0·90
2 well water pumps	5 each	Water for producers, coke discharger seals, coke quenching dri-gas plant, and general works supply		59·0	3·30	2·46
General—						
Askania governor	0·5	Regulating of pull on retorts		8·9	0·50	0·372
Shops	12·5	Driving machine tools		35·2 = 67·1	5·90	4·40
Lift	10	Intermittent traffic		23·0	11·21	8·36
				402·1		
Lighting, oxide breaker, and general works purposes				274·7		
			Total	676·8		

ally it was decided that a reconstruction in the existing building could be made to meet all needs.

The work has now been satisfactorily completed, and it has been possible to give detailed costs and working results over the past six months.

The general organization of the departments housed in the building is illustrated in Chart 3.

LAYOUT OF BUILDING.

The yard and ground floor are given over to:

(*a*) transport reception and despatch over a loading bank 85 ft. long with four points of access to stores, including lift gates;

(*b*) reception of cookers from the district for renovation;

(*c*) gas fired incinerator;

(*d*) shot blast plant;

(*e*) pipe and general store for all articles normally issued over a counter;

(*f*) fitters assembly and locker room;

(*g*) district fitting inspectors' office;

(*h*) mains and services office.

The first floor is devoted to offices and store for appliances, &c., normally issued for conveyance by transport, and the second floor to stove renovation shop, meter repair, and general sheet metal shop.

TABLE 7.—*Comparisons of Screening with Efficiencies—Eastcroft and Basford.*

—	Eastcroft (Gyrex and Undulo Screens).					Basford (Rotary Screens).			
Average Weight of Coke per Draw	9·5 Tons					17·2 Tons.			
Average Time for Screening	37 Minutes					65 Minutes.			
Screening Rate, Tons per Hour	15·4 Tons					15·88 Tons.			
1	2	3	4	5	6	7	8	9	10
Description of Fuel	Large Coke.	Fine Coke Breeze.	No. 1's.	No. 3's.	No. 5's.	Rough Breeze.	No. 3's.	No. 5's.	Large Coke.
Type of Screen	Gyrex Shaker (Over).	Gyrex Shaker (Through).	Undulo (Through).	Undulo (Through).	Balance (Over).	Rotary (Through).	Rotary (Through).	Rotary (Through).	Balance (Over).
Size of screens	1¾ in. sq. mesh	½ in. sq. mesh	Through ⅞ in. × ¾ in. rectangular	Through 1⅛ in. diam. hole		Through ¾ in. diam.	Through 1¼ in. diam.	Through 2 in. diam.	
Screening area, sq.ft.	5 ft. 0 in. × 2 ft. 6 in. = 15·0	8 ft. 6 in. × 3 ft. 6 in. = 29·75	29·28	58·56		73·33	104·22	111·66	
Area of holes in screens	9·53	14·10	12·76	20·42		36·72	57·27	61·26	
Tons produced per hour	7·50	2·03	1·12	2·64	2·11	2·23	2·23	4·91	6·51
Above as percentages of whole	48·70	13·18	7·27	17·14	13·71	14·04	14·04	30·92	41·0
Tons of material dealt with per screen section per sq.ft. per hour	1·026	0·265	0·200	0·081		0·217	0·131	0·102	
Ditto per sq.ft. of holes	1·615	0·560	0·460	0·233		0·432	0·238	0·186	
Percentage of large coke in	80·7								43·55
Percentage of No. 5's in	14·2				95·0			70·27	43·38
Percentage of No. 3's in	2·41			89·0	3·8		84·73	25·23	8·85
Percentage of No. 1's in	1·01		92·2		0·6				
Percentage of F.C.B. in	1·60		7·8	3·4	0·6				
Percentage of rough breeze in							15·27	4·50	4·22
Percentage of total coke passing through each screen (A)	51·30	13·18	7·27	17·14	Balance 13·71	14·04	14·04	30·92	Balance 41·0
Percentage which should have passed through each screen (B)	60·70	14·41	9·32	17·83	..	19·28	28·58	54·26	
Percentage efficiency $\frac{A}{B} \times 100$	84·51	91·46	78·09	96·13	..	72·82	49·13	56·98	

TABLE 8.—*Repair Costs, Actual and Estimated, of Eastcroft Coke Screening Plant After 19 Weeks' Life*

—	Tonnage Dealt with During 19 Weeks.	Tonnage Taken Out.	Life of Screen Weeks.	Total Tonnage Dealt with During Life.	Cost of Renewal Material and Labour.	Cost per Ton of Coke Dealt with During Life.	Estimated Cost of Renewal Material and Labour for 32,000 Tons Dealt with in 12 Months.
1	2	3	4	5	6	7	8
					£ s. d.		£ s. d.
Scalper	11,842	4,932	(1) 16	10,000	2 9 6	0·059	8 0 10
			(2) 18	11,200	2 9 6	0·053	7 3 0
Fine breeze gyrex	6,910	1,148	(1) 7	2,520	1 18 0	0·180	14 2 3
			(2) 8½	3,060	3 13 6	0·288	22 9 8
Undulo screen—			Estimated	Estimated	Estimated		
1st, 2 sections	5,762	677	32	9,600	9 17 10	0·247	16 1 6
2nd, 4 sections	5,085	1,439	26	7,800	19 15 8	0·608	39 11 4
	Balance 3,646						
		11,842					£107 8 7
			Estimated	Estimated	Estimated		= 0·805d. per ton
3 hopper outlet debreezers, total	6,215	186	87	28,036	15 19 0	0·615	9 10 8
Wagon loading belt	5,627		Practically as good as new				
			Estimated	Estimated	Estimated		
1 ace debreezer loading wagons	5,627	169	32	9,335	4 5 6	0·182	6 18 11
							£16 9 7
							= 0·123d. per ton

FOR COMPARISON.—Cost of renewal of screening plates, including labour for Basford rotary screens per ton of coke dealt with for year ending 31st December, 1934 = 1·238d. per ton

TABLE 9.—*Quality of Tar Produced.*

	Basford. 76 In. Retorts Downwardly Heated.		Eastcroft. 103 In. Retorts Upwardly Heated.	
Coals carbonized, Yorkshire, per cent.	9·78		13·88	
Coals carbonized, Notts. and Derby, per cent.	90·22		86·12	
Water free tar produced per ton of coal, gallons	13·67		16·29	
Specific gravity	1·115		1·08	
Gallons of tar distilled	156,400		77,800	
Tons ,, ,,	782		376	
Fuel required for distillation, lb. per ton	150		135	
		Per Cent.		Per Cent.
Liquor, gallons	3,128	2·00	1,944	2·50
Crude naphtha, gallons	2,850	1·82	2,022	2·60
Light oil, ,,	11,080	7·08	6,766	8·70
Light creosote, ,,	31,526	20·15	16,320	20·98
Creosote, ,,	35,176	22·50	18,672	24·00
Pitch, tons	350	45·00	150	39·89
Loss on distillation		1·45		1·33
Value of Tar—				
	s. d.		s. d.	
Per gallon (gross)	0 3·54		0 3·55	
Per ton coal ,,	4 0·39		4 9·83	
Per ton tar ,,	59 3		61 4	

Cost of distillation, including repairs and maintenance, 12s. per ton of tar.

STOVE RENOVATION.

The Old Method.

The old method of stove renovation consisted of two large caustic baths in the yard with a fitting shop, hand paint shop and test shop on the second floor. The average number of cookers dealt with over a year was 190 per week with 47 men employed.

Costs per cooker were as follows:—

	s.	d.
Labour	13	1·0
Gas	0	1·0
Soda	0	0·9
Slag wool	0	3·1
Coke	0	3·0
Paint	0	4·5
Supervision	0	5·6
Total per cooker	14	7·1

The requirements of the district were 250 per week, and a new plant was, therefore, installed to deal with 300 per week so as to enable us to work off the arrears.

Process and Plant.

Cookers received from the district are first inspected to determine whether they are to be renovated or scrapped.

If the latter, they are broken up on the spot and the scrapped metal is sorted into bins for sale.

The first process of renovation is incineration, and the whole cooker with the exception of brass work and wooden door knobs is loaded into the furnace. Baking extends over a period of 2¾ hours, the charge being brought to a maximum temperature of 800° F.

This process serves two purposes: (1) it cleans the enamels to such an extent that only a final polish is necessary, and (2) it reduces all fat and other matter to a dry brittle scale.

The next step is the removal of this scale from the cast parts, which is effected by means of a shot blast applied at a pressure of 30 lb. per square inch.

The castings are now, for all practical purposes, as clean as when they left the mould and are in a perfect condition for receiving paint.

Before being painted the cooker is examined to ascertain whether any parts are worn, broken, or missing, and these having been adjusted the cooker is passed forward for painting. Paint is applied by means of spray guns and is followed by stoving for 35 minutes at a temperature of 250° F. Loose parts, such as burners, deflectors, oven grids, &c., are dipped in a paint bath and afterwards stoved.

It is at this stage that the interior enamels receive their final polish before the cooker is passed to the assembling and testing benches.

In the meantime the brass work, removed before the incineration stage, has been sent to the stove shop, and after passing through a hot caustic bath to remove surface grease, goes forward to the polishing buffs and ultimately to the brass finishing bench where taps are repaired or renewed as required.

In spite of standardization we find it advisable to label tap rails in order that they may be refitted to their original positions. Thus the cooker and tap rails meet again on the assembling and testing benches, and in a finished state are sent to the first floor appliance store for issue to the District.

TABLE 10.—*Cost of Stove Renovation Plant and Installation.*

1	2
	£ s. d.
Gas fired incinerator	456 7 6
Erection of ,,	70 11 1
Shot blast plant	1,084 2 10
Erection of plant	128 10 11
Foundations of both above (including alterations to building)	281 11 6
Spray painting equipment	170 13 0
Erection of painting equipment	87 11 5
Stoving ovens	98 19 0
Erection of ovens	14 17 1
Dust extraction plant	84 0 0
Total	£2,477 4 4

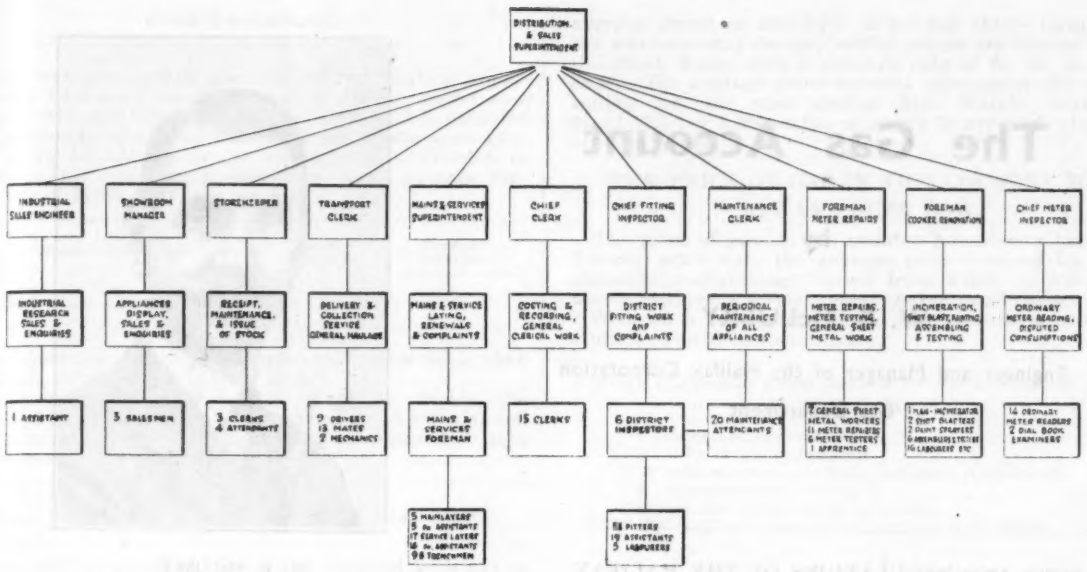

DISTRIBUTION & SALES SUPERINTENDENT
INDUSTRIAL SALES ENGINEER
SHOWROOM MANAGER
STOREKEEPER
TRANSPORT CLERK
MAINS & SERVICES SUPERINTENDENT
CHIEF CLERK
CHIEF FITTING INSPECTOR
MAINTENANCE CLERK
FOREMAN METER REPAIRS
FOREMAN COOKER RENOVATION
CHIEF METER INSPECTOR
INDUSTRIAL RESEARCH SALES & ENQUIRIES
APPLIANCES DISPLAY, SALES & ENQUIRIES
RECEIPT, MAINTENANCE, & ISSUE OF STOCK
DELIVERY & COLLECTION SERVICE GENERAL HANDS
MAINS & SERVICE LAYING, RENEWALS & COMPLAINTS
COSTING & RECORDING, GENERAL CLERICAL WORK
DISTRICT FITTING WORK AND COMPLAINTS
PERIODICAL MAINTENANCE OF ALL APPLIANCES
METER REPAIRS, METER TESTING, GENERAL SHEET METAL WORK
INCINERATION, SHOT BLAST, PAINTING, ASSEMBLING & TESTING
ORDINARY METER READING, DISPUTED CONSUMPTIONS
1 ASSISTANT
3 SALESMEN
3 CLERKS 4 ATTENDANTS
9 DRIVERS 13 MATES 2 MECHANICS
MAINS & SERVICES FOREMAN
15 CLERKS
6 DISTRICT INSPECTORS
70 MAINTENANCE ATTENDANTS
1 GENERAL SHEET METAL WORKERS 11 METER REPAIRS 6 METER TESTERS 1 APPRENTICE
1 MAN - INCINERATOR 2 SHOT BLASTERS 2 PAINT STRIPPERS 6 ASSEMBLERS & TESTERS 10 LABOURERS ETC
14 ORDINARY METER READERS 2 DIAL BOOK EXAMINERS
5 MAINLAYERS 5 ATTENDANTS 17 SERVICE LAYERS 16 ATTENDANTS 98 TRENCHMEN
58 FITTERS 19 ASSISTANTS 5 LABOURERS

CHART 3.—*Showing Organization of Departments Housed in Woodborough Road Building.*

TABLE 11.—*Results of Stove Renovation Plant.*

1	2
Men engaged	27
Average weekly output	292
Costs per cooker—	s. d.
Labour	5 2·0
Gas	0 7·0
Electricity	0 3·2
Abrasive	0 0·6
Paint	0 5·1
Supervision	0 3·7
Add 10 per cent. on cost of plant	0 3·9
	7 1·5

From the above it will be seen that the output has been increased by 53·6 per cent. and that the saving in labour alone is equivalent to £2,800 per annum. Apart from this there is a very large saving in light castings and interior enamels due to the fact that with the new process the cooker is not stripped and breakages are therefore eliminated. It is hardly necessary to add that the new process results in a finish vastly superior to that of the old method.

The saving in labour following the introduction of the stove plant proved a double blessing, as 20 men were taken out of the shop which resulted in very much more work area for others.

Fortunately the displaced labour was utilized by training the men as consumers' maintenance fitters, and they are doing a most valuable work and building up a goodwill which is giving satisfaction to the Undertaking and to the consumers.

GENERAL REMARKS.

Owing to the fact that the Department has had to be kept running throughout, it was not possible to let the work of reconstruction to contract, and it has therefore been carried through by the tradesmen of the Undertaking at a total cost of £7,559 9s. 3d., including all plant referred to above. This covers the construction of the offices, the installation of steel storage bins in the stores, the provision of a steel cycle park and the erection of a transport loading bank.

The detailed costs are given in Table 12.

TABLE 12.—*Costs of Reconstruction of Distribution Shops.*

1	2
	£ s. d.
Foundations	281 11 6
Shot blast plant	1,212 13 9
Incinerator	526 18 7
Spray painting	258 4 5
Enamelling stoves	113 16 1
Electric lift	441 12 6
Dust extraction plant	84 0 0
Central heating plant	562 3 9
Stores, racks, &c.	370 0 0
Offices	1,229 15 7
Yard	47 12 8
Plumbing and gas fitting	366 13 7
General alterations and expenses, removal of stores, shops, offices, and general	2,064 6 10
	£7,559 9 3

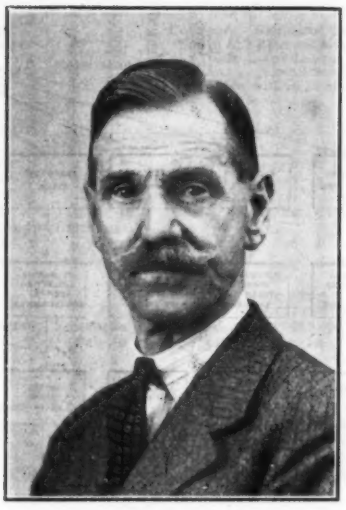
The results enable the Undertaking to give a good service and under conditions for our employees that are in keeping with the importance of the Department.

The Gas Account

by

W. B. McLUSKY

Engineer and Manager of the Halifax Corporation Gas Department



W. B. McLUSKY.

Mr. W. B. McLusky spent the first seven years of his business career in the workshops of the well-known Clydeside engineers and shipbuilders, Messrs. Blackwood & Gordon. His early studies were directed by Andrew Spoull, James McCubbin, and James Duff, in various branches of mechanical and gas engineering and chemistry. After holding appointments as Engineer and Manager of various Scottish Gas Undertakings from 1891 onwards, Mr. McLusky was appointed to his present position in charge of the Halifax undertaking in 1912. He has held official positions in various of the District Associations, including the Presidency of the Manchester, North British, and Waverley.

CHARGES AND REGULATIONS OF THE HALIFAX CORPORATION GAS SUPPLY.

SCALE 1.—*General Rate for all Premises.*

—	Per 1,000 Cu.Ft.	Per Therm.
	s. d.	d.
First 2,000 cu.ft. per quarter	3 8	11
Next 10,000 ,, ,,	3 6	10½
,, 12,000 ,, ,,	3 4	10
,, 48,000 ,, ,,	3 2	9½
,, 178,000 ,, ,,	3 0	9
,, 500,000 ,, ,,	2 6	7½
In excess of 750,000 cu.ft. per quarter	2 0	6

Meter Rents in addition, as per Scale later.
The following alternative Rates are available to those who sign the required agreements.

SCALE 2.—*Two-Part Scale for Domestic Purposes for Coin or Ordinary Meters.*

PRICE OF GAS	Per 1,000 Cu.Ft.	Per Therm.
	s. d.	d.
Up to 48,000 cu.ft. per quarter	2 0	6
All over 48,000 cu.ft. per quarter	1 3	3¾

PLUS A SERVICE-RENTAL on the following basis:—

Floor Area of Living and Reception Rooms.	Service-Rental per Quarter.
	s. d.
Up to 240 square feet	6 6
241 square feet to 266 square feet	7 3
267 ,, ,, 293 ,,	7 11
294 ,, ,, 320 ,,	8 8
321 ,, ,, 346 ,,	9 5
347 ,, ,, 373 ,,	10 1
374 ,, ,, 400 ,,	10 10

And so on at the rate of one penny per quarter for each three square feet of floor area above 400 square feet.
Meter Rents in addition, as per Scale later.

SCALE 3.—*Two-Part Scale for any Domestic, Commercial, or Industrial Purpose (Houses, Shops, Workshops, Warehouses, Offices, Public Buildings, Hotels, Cafés, &c.).*

PRICE OF GAS	Per 1,000 Cu.Ft.	Per Therm.
	s. d.	d.
Up to 250,000 cu.ft. per quarter	2 0	6
All over 250,000 cu.ft. per quarter	1 3	3¾

SCALE 3 (*continued*).

PLUS A SERVICE-RENTAL per quarter as follows:—

Up to a demand of 50 cu.ft. per hour, a service-rental of 6s. 6d. for every 50 cu.ft. in the hourly demand under full load.

Over 50 cu.ft. per hour and up to 100 cu.ft. per hour a service-rental of 6s. 6d. for every 45 cu.ft. in the hourly demand under full load.

Over 100 cu.ft. per hour and up to 200 cu.ft. per hour a service-rental of 6s. 6d. for every 40 cu.ft. in the hourly demand under full load.

Over 200 cu.ft. per hour a service-rental of 6s. 6d. for every 30 cu.ft. in the hourly demand under full load.

N.B.—Where the maximum demand is more or less than any of the figures set out in the Scale the nearest figure will be taken.

The maximum hourly demand shall be the maximum volume of gas which the meter indicates that the consumer may call for.

The maximum service-rental per quarter payable by any consumer shall not amount to more than a sum equal to £4 0s. 0d. per week for *One Premises.*

SCALE 4 and SCALE 5.—*These are no longer in use.*

SCALE 6.—*Gas for Central Heating, Water Heating, Individual Radiators, and other purposes for which Gas may be required for use over long periods, or in the evenings or night-time, or for lighting additional to the above.*

The Scale is based on a "gas unit" of 4,000 British Thermal Units, which at the declared calorific value of gas of 400 British Thermal Units per cubic foot, is equivalent to ten cubic feet of gas.

Winter Rating.	Price per 1,000 Cu.Ft.	Price per Gas Unit.
	s. d.	d.
First ninety hours' use per month	2 3	0·27
Second ,, ,, ,,	2 0	0·24
Third ,, ,, ,,	1 9	0·21
Fourth ,, ,, ,,	1 6	0·18
Fifth ,, ,, ,,	1 4	0·16
Sixth ,, ,, ,,	1 2	0·14
Seventh ,, ,, ,,	1 0	0·12
Eighth ,, ,, ,,	1 0	0·12

SCALE 6 (*continued*).

Consumers who install gas-fired central heating apparatus may have such supply through a separate meter at a charge of 3½d. per therm (1s. 2d. per 1,000 cu.ft.), provided an Agreement be entered into ensuring a minimum payment of £6 1s. 4d. during the winter months—October to March. (This minimum is equivalent to an average consumption of 4,000 cu.ft. per week.)

Summer Rating.	Price per 1,000 Cu.Ft.	Price per Gas Unit.
	s. d.	d.
(April-September)	1 4·2	0·162

The minimum charge per quarter under this Scale shall be 7s. 6d., whether gas is used or not.

The Corporation reserves the right to decide the purposes for which gas shall be supplied on this Scale, and consumers supplied on this Scale will be required to sign the necessary Agreements.

SCALE 7.—*Storage Water Heaters, at all-in Rate.*

These will be provided, fixed, and supplied with gas at an all-in rate as follows:—

	£ s. d.	
20 gallons size 4d. per day	1 10 5	per quarter
30 ,, ,, 6d. ,, ...	2 5 8	,, ,,
40 ,, ,, 8d. ,, ...	3 0 10	,, ,,

SCALE 8.—*High-Pressure Gas Lamps (Shop Window Lighting).*

This class of supply is available in certain areas of the Borough at the following rates, which include the loan of lamps and fixing of same, together with all maintenance charges, viz.:—cleaning, lighting, extinguishing, the renewal of mantles and globes as required, with the supply of gas:—

	£ s. d.	
500 candle power	2 6 0	per annum
1,000 ,, ,, ...	3 4 0	,, ,,
1,500 ,, ,, ...	4 0 0	,, ,, (payable quarterly)

The lamps are lighted at dusk and extinguished at 10 p.m. over an agreed period.

Special lighting required beyond the above hours will be arranged upon application.

Rents of Gas Meters.

The Corporation will supply Meters, and keep them in repair, at the following Rents per Quarter:—

	s. d.		s. d.
2-light	0 4	Size 1	0 7
3 ,, ...	0 5	,, 2	0 7
5 ,, ...	0 7	,, 3	0 11
10 ,, ...	0 11	,, 4	1 3
20 ,, ...	1 3	,, 4a	1 9
30 ,, ...	1 9	,, 5	2 4
40 ,, ...	2 4	,, 5a	3 6
50 ,, ...	2 11	,, 6	4 6
60 ,, ...	3 6	,, 7	5 3
80 ,, ...	4 6	,, 8	7 3
100 ,, ...	5 3	,, 9	7 3
150 ,, ...	7 3	,, 10	9 0
200 ,, ...	9 0	,, 11	13 0
250 ,, ...	11 0	,, 12	15 0
300 ,, ...	13 0		
400 ,, ...	14 0		
500 ,, ...	15 0		
600 ,, ...	16 0		
1,200 ,, ...	26 3		

	s. d.
High capacity meter, size 2	0 7
,, ,, ,, ,, 3	0 11
,, ,, ,, ,, 4	1 3
,, ,, ,, ,, 4a	1 9
,, ,, ,, ,, 5	2 4
,, ,, ,, ,, 6	4 6

Rent of coin meters, up to size 3, 2s. 2d. per quarter

Consumers supplied through coin meters for domestic purposes may pay the following extra charge in lieu of the rent of the meter.

Meter and coin mechanism . . . . . 1½d. per therm

Many of the occupants of the smaller houses in Halifax, who have adopted the Two-part Tariff, are buying gas at average prices on the level of pre-war rates—inclusive of the service-rental charge; whilst others are buying gas on the Block Scale, with a primary rate of 3s. 8d. per 1,000 cu.ft. The average price received throughout the area of supply for the year ending 31st March, 1934, was 2s. 11·47d. per 1,000 cu.ft., or nearly 50 per cent. above the pre-war figure.

THE PRICE OF GAS IN THIS COUNTRY HAS ALWAYS BEEN LOW.

The price of gas in this country has always been low. Twenty years ago, the average price received by representative undertakings varied from 2·39d. to 5·90d. per therm, without a service-rental charge in addition.

With such low prices there was no urgent need for Multiple Tariffs in this country.

TABLE 1.—*Average Prices Received for Gas in 1914 and 1934 for 24 Undertakings.*

"C" indicates statutory company.
"M" indicates municipal authority.
"N" indicates near the coal fields; carriage 4s. or less per ton.
"S" indicates sea-borne coal and oil.
"H" indicates carriage over 7s. 6d. per ton.
"M/N" indicates carriage over 4s., but under 7s. 6d. per ton.

—	—	Price in Pence per Therm.	
		1914.	1934.
1	2	3	4
1	M.N.	2·39	7·50
2	C.N.	2·66	4·62
3	C.N.	3·60	8·57
4	M.M/N.	3·90	6·34
5	M.N.	4·12	7·38
6	C.S.	4·12	6·03
7	M.S.	4·14	5·88
8	M.N.	4·32	6·40
9	C.N.	4·36	6·83
10	M.N.	4·40	8·18
11	M.M/N.	4·44	8·61
12	C.N.	4·47	5·71
13	C.N. & S.	4·47	7·35
14	M.N. & S.	4·48	6·89
15	M.N.	4·48	7·70
16	M.M/N.	4·50	8·12
17	C.N.	4·64	6·01
18	M.N.	4·70	8·87
19	M.M/N.	4·72	8·87
20	M.M/N.	4·74	7·88
21	C.S.	4·91	8·21
22	C.H.	4·97	8·46
23	C.S.	5·19	8·36
24	C.S.	5·90	8·26

The calculations for the year 1914 are based upon a calorific value of 500 B.Th.U. in every case.

The calculations for the year 1934 are based upon the calorific value declared by each individual undertaking.

Yet, as early as the year 1891, Mr. R. Bruce Anderson had applied a scheme of reduced charges for all gas used in excess of normal requirements; and Doctor Hopkinson had founded the Multiple Tariff system in the United States of America.[1]

In the year 1894 the Kirkcudbright Gas Department instituted a 25 per cent. rebate on all gas used during the four months 1st May to 31st August. In 1898 the Selkirk Gas Company gave rebates for all gas registered by coin meters in excess of 3,000 cu.ft. per quarter. The "Perth Parcels Scale"—now called a "Block Tariff"—was introduced in the year 1905.

The Norwich Electricity Supply Undertaking adopted Doctor Hopkinson's Multiple Tariff in the year 1907; and the municipalities of Bradford, Carlisle, Luton, Sheffield, and Tynemouth were not far behind.

Mr. William Lackie, M.I.E.E., formerly the Chief Electrical Engineer and General Manager of the Glasgow Corporation Electricity Department, and later a member of the Electricity Commission, applied his "maximum demand" system in the Glasgow area in the year 1910—3d. per unit for the first two hours' use of the maximum demand and 1d. per unit for all energy used in excess of that quantity.

In the year 1912 the first Block Tariff for Industrial Purposes was introduced in Halifax; not a block of uniform dimensions, the volume of gas in the first block varying in accordance with the maximum hourly demand of the individual consumer.

The first block was charged at the Flat Rate then in operation, namely, 1s. 10d. net per 1,000 cu.ft.; and all gas used in excess of the first block at 1s. per 1,000 cu.ft.

[1] See Glaeser's "Outlines of Public Utility Economics" (1927), p. 671.

This scheme was followed, in the year 1917, by the Halifax "Standard Requirements Scale" for Domestic Purposes. In this scale the consumer paid the Flat Rate—which at that date was 2s. 6d. per 1,000 cu.ft.—for all gas used up to 800 hours' use of the average lighting requirements of the living and reception rooms, and 1s. 11d. per 1,000 cu.ft. for all gas used in excess of that quantity.

The Two-part Tariff for Domestic and Industrial Purposes followed in the year 1922. The author made reference to these Scales in his Paper "Charges for Gas and Service. The Equitable Distribution of Overhead Charges" presented to the 63rd Annual General Meeting of the Institution, 1926.

It is significant that the Norwich System for the supply of electricity for domestic purposes made progress after the alternative flat rates were raised. The ratio is now 10 to 1 in many towns: flat rate 5d.; commodity price in the Multiple Tariff ½d. per unit.

The Flat Rate quoted by gas undertakings rarely exceeds the equivalent of ½d. per unit. The average price received by the representative gas undertakings, set out in Table 1, ranges from 4·62d. to 8·87d. per therm—equivalent to 0·184d. and 0·354d. per unit of 4,000 B.Th.U.

These are low average prices, especially taking into account the voluntary services rendered to the consumer by gas undertakings—services which, to quote the London Gas Referees, "are equivalent in their economical effect to a reduction in the price of gas."

But it is not enough to have a low average price received—unless the average user is enjoying, to some extent, the advantages of that low figure.

The low price must reach, or, at any rate, should be available to, every customer who is prepared to exercise his maximum demand over a longer period of time than his neighbours in like circumstances, who may be—and in many cases are—using gas only intermittently, or as a standby.

It is true that, in the Perth Parcels Scale of 1905, the buyer had to pay 2s. 6d. per 1,000 cu.ft. for the first parcel, and only 1s. for the last, but the average price (of all the "parcels" or "blocks") did not get below 1s. 6d. per 1,000 cu.ft., or 40 per cent. less than the highest price charged.

There is a limit to the proportion of "manufactured" gas (gas manufactured as the primary product) that can be supplied at the "commodity" rate in a Multiple Tariff, or at the lowest price in a Block Tariff, unless the service-rentals charged in the Multiple Tariff, or the "concealed" service-rental in the Block Tariff, provide a sufficient margin to cover the overhead charges on the additional manufacturing and distributing plant required to meet the increased demand for gas. That limit has been reached in Halifax; the ratio is now 3 to 1. A strictly scientific scale of charges makes provision for all the elements in the costs schedule, present and to come.

The essential difference between the Multiple Tariff and others is, that in the Multiple Tariff the customer commits himself to the payment of a service-rental;[2] whereas in all other scales of charges the customer is committed to nothing.

SCALES OF CHARGES IN OPERATION IN THIS COUNTRY AND THE EFFECT OF THE COST OF TRANSMISSION AS DISTINCT FROM DISTRIBUTION, UPON THE SERVICE-RENTAL CHARGES.

The following scales of charges are in operation in this country to-day:—

1. The Flat Rate—with discounts.
2. The Block Tariff.
3. The Steps Scale.
4. The Multiple Tariff—optional.

[2] The service-rental charge, for domestic purposes, has been confused with the minimum charges—varying from 7s. 6d. to 15s. per quarter—levied by some electricity undertakings.

The following is an extract from a leading daily newspaper with a large circulation in Yorkshire. The reference is to electricity supply:—

> "A Minimum Charge may have been necessary at the beginning of the electricity undertaking, to prevent unremunerative expenditure, but, now that the cables are laid to all parts of the town, it is surely an imposition. There is no doubt that the Minimum Charge is an irritation to thrifty householders. They dislike paying for electricity which they have not consumed. . . . There are innumerable small consumers of electricity who only need it for limited periods. . . . The large consumer is not affected, because he uses far in excess of the Minimum Charge."

The choice of Scale is governed by:—

(*a*) The cost of the commodity (Works Cost).

(*b*) Distribution and "Overhead" Charges.

(*c*) The consumer's total consumption of gas per month or per quarter, in relation to his maximum hourly demand,

and

The effect of these elements upon the "price of gas."

In assessing the maximum demand, it is not usual to differentiate between premises near, and far from, the source of the supply.

The cost of transmission and distribution is usually apportioned in relation to the average cost, and, in the larger towns, this figure is, invariably, high.

The advantage is not always with the large undertaking. Large undertakings, in many cases, have consumers whose hourly demand is large, but whose quarterly account is not large in proportion to that demand.

When, in cases like this, the maximum demand is high in relation to the quarterly consumption of gas, the consumer is not disposed to pay a service-rental charge based upon the maximum hourly demand; he prefers a Steps Scale or a Block Tariff. But such consumers make their choice with the knowledge that they will have to pay more, especially towards the lower end of the Scale, than would be necessary on a Multiple Tariff.

In Halifax, the consumer's choice is limited to the Block Scale and the Multiple Tariff; there is no Flat Rate.

TABLE 2.—*Examples of Increased Business resulting from the Operation of Multiple Tariffs in Halifax. Extracts from the Consumers' Rent Roll—Scale 2—Domestic Supply.*

Consumer. No.	Annual Assessable Value.	Service-Rental Charge per Quarter.	Gas Used for 12 Months Ending 31st March, 1935.	Gas Used Before Introduction of Multiple Tariff.
1	2	3	4	5
	£	£ s. d.	Cu.Ft.	Cu.Ft.
1	78	17 4	134,800	97,100
2	76	1 0 11	261,400	151,700
3	137	1 6 0	241,400	42,000
4	76	1 1 8	148,500	50,300
5	71	13 9	185,300	61,400
6	34	14 5	100,700	44,000
7	50	18 1	71,600	44,500
8	57	18 1	164,300	80,200
9	103	1 6 0	138,400	106,900
10	117	1 6 0	703,700	224,900
11	58	1 6 0	109,900	23,500
12	68	16 7	179,200	37,000
13	113	1 6 0	311,700	47,700
14	122	1 3 1	238,900	177,700
15	77	17 4	141,100	75,800
16	50	15 11	88,500	54,800
17	66	18 1	123,800	31,800
18	70	15 11	129,700	52,400
19	64	17 4	86,800	58,200
20	60	1 6 0	266,600	24,700
21	40	18 9	148,000	102,200
22	54	18 9	107,000	71,500
23	66	1 0 3	68,200	11,400
24	69	18 9	96,600	42,700
25	76	1 3 1	224,900	11,700
26	53	1 1 8	142,900	100,200
27	80	1 6 0	357,200	96,000
28	40	17 4	213,800	49,500
29	31	17 4	108,600	67,200
30	40	17 4	89,400	41,200
31	56	18 1	189,500	110,700
32	45	17 4	86,600	65,300
33	40	19 6	250,700	20,500
34	14	8 8	92,400	42,600
35	11	11 7	132,400	40,700
36	7	7 3	48,400	14,900
37	13	9 5	117,100	13,700
38	9	11 7	137,400	54,600
39	30	15 2	130,200	54,200
40	16	10 1	91,000	61,100
41	34	10 10	131,700	67,200
42	54	14 5	82,200	61,300
43	11	8 8	143,600	29,700
44	40	19 6	205,300	50,200
45	14	7 11	56,900	22,400
46	56	15 11	138,400	63,400
47	13	7 11	72,000	20 500
48	18	10 10	143,900	38,600
49	14	11 7	152,300	76,800
50	43	17 4	143,300	80,300
51	26	12 3	91,300	25,300
52	36	11 7	87,300	26,800

TABLE 2 (*continued*).—*Examples of Increased Business resulting from the Operation of Multiple Tariffs in Halifax. Extracts from the Consumers' Rent Roll—Scale 2—Domestic Supply.*

Consumer. No.	Annual Assessable Value.	Service-Rental Charge per Quarter.	Gas Used for 12 Months Ending 31st March, 1935.	Gas Used Before Introduction of Multiple Tariff.
1.	2	3	4	5
53	16	7 11	72,400	12,800
54	37	12 3	82,600	51,500
55	11	10 10	114,300	27,000
56	40	18 9	290,200	162,800
57	22	8 8	63,700	28,800
58	30	10 10	70,100	38,900
59	8	6 6	59,100	18,700
60	9	6 6	43,600	11,000
61	9	6 6	44,700	13,400
62	9	6 6	64,600	14,000
63	12	6 6	123,900	24,700
64	9	6 6	56,900	17,900
65	5	6 6	88,100	23,600
66	8	6 6	50,300	18,600
67	8	6 6	58,500	26,700
68	9	6 6	59,800	12,400
69	4	6 6	54,800	25,800
70	9	6 6	53,800	21,300
71	10	6 6	97,900	14,200
72	9	6 6	72,800	15,200
73	10	6 6	52,300	17,400
74	10	6 6	64,700	21,100
75	10	6 6	71,900	45,400
76	10	6 6	54,400	36,200
77	7	6 6	55,900	32,600
78	15	6 6	72,700	42,300
79	10	6 6	61,700	23,400
80	15	6 6	107,400	30,500
81	7	6 6	74,200	19,200
82	5	6 6	51,700	21 400
83	10	6 6	70,700	65,500
84	9	6 6	66,000	16 000
85	7	6 6	50,600	8 000
86	9	6 6	51,600	12,200
87	25	10 1	83,600	15,100
88	15	10 1	74,600	67,900

The service-rental charge is not based upon the assessable value, but upon the floor area of the living and reception rooms.

It will be observed that, in some cases, the assessable value is high in relation to the size of the living and reception rooms. "Site value," amenity, and other considerations affect the assessable value, and, in any event, the assessable value is subject to quinquennial variations, unconnected with gas supply.

The rateable value of the premises is shown here merely to indicate as nearly as possible the size of the premises.

THE EFFECTS OF A HIGH FLAT RATE OR A HIGH PRIMARY RATE IN A BLOCK TARIFF.

A high flat rate, or a high primary rate in a Block Tariff, tends to drive users of gas to alternatives—alternatives presented to them in a more attractive form.

The primary rate in a Block Tariff—that is to say, the price charged for the first block—is quoted against us as the "Price of Gas." It may not be high, but it appears high in contrast with electricity at ½d. per unit. Yet, it is not always high enough to meet the cost of the commodity and the overhead charges.

Would it not be better to present the price of gas in a more attractive form? For example, instead of quoting 4s. 2d. per 1,000 cu.ft., why not quote ½d. per unit?

When electricity is sold at ½d. per unit, there is a service-rental charge in addition; but, when gas is sold at ½d. per unit, there is no service-rental charge.

Rather than offer blocks of gas for sale at:—

50 pence,
40 pence and
30 pence

per 1,000 cu.ft., I would suggest that we should move the decimal point two places to the left, and sell gas at:—

0·50 pence,
0·40 pence and
0·30 pence per unit.

The relative values of the "Unit of Electricity" and the "Therm of Gas" are not understood by the average user. 25 units at ½d. each, for example, would make a more popular appeal than 1 therm at 6¼d.

There are many consumers of gas who are disposed to make more use of the supply, but who prefer to "pay as they go," rather than undertake the payment of a quarterly service-rental charge whether they use the gas or not. Such consumers, if they realized that gas could be had at prices ranging from ½d. per unit downwards without any service-rental charge, would use more gas to their own advantage. The increased consumption could invariably be met without further outlay upon mains and service pipes; and the increased receipts, even at the lower end of the scale, would provide a sufficient margin to make the business profitable.

But, a scale that enables the consumer to contract for the payment of a quarterly service-rental charge—independently of the volume of gas consumed—is conducive to pleasant business relations and the extension of the use of gas.

The consumer who adopts the Multiple Tariff anticipates the service-rental charge; it is budgetted for, like any other

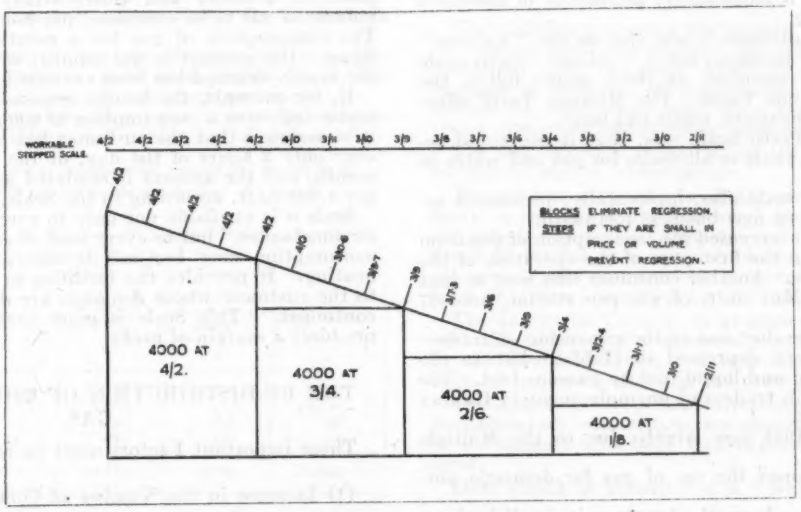

WORKABLE STEPPED SCALE.
4/2 4/2 4/2 4/2 4/2 4/0 3/11 3/10 3/9 3/8 3/7 3/6 3/4 3/3 3/2 3/0 2/11
BLOCKS ELIMINATE REGRESSION.
STEPS IF THEY ARE SMALL IN PRICE OR VOLUME PREVENT REGRESSION.
4000 AT 4/2.
4000 AT 3/4.
4000 AT 2/6.
4000 AT 1/8.

FIGURE 1.—*Diagram showing Comparison of Block and Stepped Scales. Figure 1 is purely a diagram. It presents a Block Tariff in which the primary rate is raised to conserve the revenue. The receipts at the lower end of the Scale are above the cost of providing the commodity. The difference between the cost of the commodity and the price per 1,000 cu.ft. received for the first block is high enough to meet the amount required in respect of service-rental. A Block Tariff, constructed on these lines, produces a higher average price than the Multiple Tariff, but, invariably, less business. This diagram shows that a Steps Scale and a Block Tariff may serve the same purpose. But the great advantage of the Block Tariff is that the consumer is conscious of the fact that he is buying gas at 3s. 4d. and 2s. 6d. and 1s. 8d. How often do we hear the remark, "They are selling gas at 1s. 8d. in Brigford. Why can't you do the same? Your lowest price is 2s. 11d."*

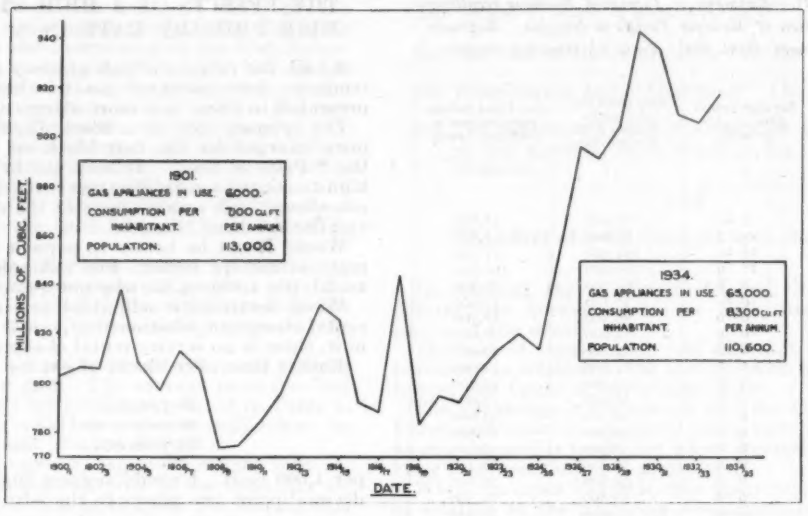


FIGURE 2.—*Gas Sold in Halifax*, 1900-1934. *Figure 2 shows the effect of fluctuating trade in an industrial area. Industrial depression not only reduces the use of gas for industrial purposes, but creates unemployment, and reduces the spending power of a large percentage of the domestic users. The increase in the consumption of gas in Halifax since the introduction of the multiple tariff is well shown in this graph.*

rate or rent, and, the commodity charge being low, any variation in the volume of gas consumed, owing to vagaries in the weather or other unremembered cause, makes smaller the money value of the increase and, therefore, less onerous.

For example, an increase of 6,000 cu.ft. at 3s. 4d. adds £1 to the quarterly account; whereas a similar increase at the commodity figure of 1s. 3d. would add only 7s. 6d.

GAS, AND NOTHING ELSE, SHOULD BE CHARGED "AS PER METER INDEX."

In the Multiple Tariff, the meter is used for its legitimate purpose, the measurement of gas. No consumer—unless he wills it so—should be obliged to pay "overhead" charges "as per meter index."

Every scale that provides for the equitable distribution of overhead charges is immediately productive of increased business, see Table 2.

The Perth Scale, although it was cast on the "volume" basis, attracted new business; but a "volume" basis scale seldom brings such increases as those which follow the operation of a Multiple Tariff. The Multiple Tariff offers advantages to all consumers, small and large.

A feature of the Perth Scale was, that it prevented regression—a common fault in all scales for gas and water in those days.

The first Halifax scale also, incidentally, prevented regression; and produced new business forthwith.

One industrial user increased his consumption of gas from 12 to 26 Mn. cu.ft. in the first year of the operation of the new Scale of Charges. Another consumer who was, at that time, using only 5 Mn. cu.ft. of gas per annum, used 37 Mn. cu.ft. last year.

These increases are due, not to the expansion of trade—for trade is still very depressed in Halifax—but to the displacement of solid and liquid fuel by gaseous fuel. The effect of depression in trade and unemployment in Halifax is shown in Figure 2.

The increase in 1924 was largely due to the Multiple Tariff.

Scale 2 has developed the use of gas for domestic purposes, see Table 2.

Scales 3 and 6 have been of advantage in small business premises, offices, public buildings, libraries and the like; and in factories and workshops where there is no large demand for gas for process work. Scale 3 is framed specially to serve this need; the need for small, individual apparatus in any separate part of the premises. The hourly demand charge may be based on the maximum demand of each separate or individual appliance. The application of this principle extends to all users of gas for any lighting, cooking, heating, or power purpose in the area.

Scale 3 has developed the use of gas. For example, a customer residing in a large house may start with only one gas appliance. That customer may say, "I don't want to pay a service-rental charge based upon the assessable value of my residence. I want only a gas fire, or a water heater, or a complete equipment for my kitchen or laundry." The service-rental charge on any of the appliances mentioned may be 6s. 6d. per quarter. But when one apparatus follows another, and the combined assessment on all the appliances fixed in that premises reaches the amount of the service-rental charge applicable to the whole of the premises, the account is transferred to the appropriate scale, to the benefit of the consumer.

This is a means of approach that has yielded satisfactory results in factories and workshops, to a remarkable extent. One manufacturer who started with a single furnace and a few tools is now making good use of a new 6-in. service pipe.

Scale 6 presents advantages to the consumer in a different form. Here, the dial of the gas meter serves the dual purposes of a meter and (inferentially) a timepiece. The volume of gas to be consumed per hour is first ascertained. The consumption of gas for a month is divided by that figure: the product is the number of hours during which the hourly demand has been exercised over the month.

If, for example, the hourly demand is 10 cu.ft., and the meter indicates a consumption of 900 cu.ft. for the month, it is assumed that the customer has exercised his demand over only 3 hours of the day, or the first 90 hours in the month; and the account is rendered accordingly, at 2s. 3d. per 1,000 cu.ft. according to the Scale.

Scale 6 is available not only to every "customer in like circumstances," but to every user of gas, however small his consumption may be; and it incorporates lighting with heating. It provides the facilities in price which are due to the customer whose demands are diversified and "long continued." This Scale is more than self-supporting: it produces a margin of profit.

THE RE-DISTRIBUTION OF THE DEMAND FOR GAS.

Three important Factors must be considered:—

(1) Increase in the Number of Consumers.

(2) Increase in the Total Sale of Gas.

(3) Decrease in the Average Consumption of Gas per Consumer.

The number of consumers has increased most, in recent years, south of the line from "The Wash to the Bristol Channel," but there have been encouraging increases in other parts of the country despite the depression in trade—but chiefly for domestic and other purposes not directly connected with industry.

TABLE 3.—*Analysis of Gas Used in Halifax, 1933-1934.*

—	Number of Consumers.	Average Consumption per Consumer per Annum.	Total Gas.	Annual Revenue.	Average Price per 1,000 Cu.Ft.
1	2	3	4	5	6.
		Cu.Ft.	Mn. Cu.Ft.		s. d.
DOMESTIC—					
Using Block Tariff (Scale 1)	14,833	15,721	233·20	39,203	3 4·34
COMMERCIAL AND INDUSTRIAL—					
Using Block Tariff (Scale 1)	3,309	37,268	123·32	20,058	3 3·03
DOMESTIC—					
Using Multiple Tariff (Scale 2)	2,772	41,377	114·70	15,500	2 8·43
COMMERCIAL AND INDUSTRIAL—					
Using Multiple Tariff (Scale 3) and special scale for central heating, &c. (Scale 6)	619	234,377	145·02	16,082	2 2·61
COIN CONSUMERS—					
(Scales 4 and 5)	11,544	16,696	192·74	35,088	3 7·68
STREET LIGHTING	..	..	109·06	9,737	1 9·40
Total	33,077	..	918·04	135,668	..

This growth in the use of gas for domestic purposes, without a corresponding increase for industrial purposes, has, in some cases, reduced the average consumption of gas per consumer. One of the most progressive gas undertakings in the country has had this experience, as the following figures show:—

—	1924.	1934.	Increase. Per Cent.	Decrease. Per Cent.
Number of consumers	196,237	300,057	53	
Average consumption of gas per consumer (cu.ft.)	60,640	47,251		22

The total increase in the *sale* of gas over the period equals 17·5 per cent.

An increase in the resident population (as distinct from the "floating" population near industrial centres) and better housing, have been responsible for some increase in the number of consumers and an increase in the annual output of gas—but not always an increase in the average consumption of gas per consumer.

Improvements in gas appliances have undoubtedly enabled consumers to save gas. There could be no better stimulus to increasing business than this higher efficiency in the appliances used. And, with the large and increasing choice of appliances available for an increasing variety of purposes, the average consumption of gas per domestic consumer should increase, and not tend to reduce, the average consumption of gas per consumer over the whole area of supply.

In a few years' time, the average consumption of gas per domestic consumer, over a wide area, should be in the region of 1,000 cu.ft. of gas per customer per week.

The average consumption of gas per annum for all purposes, in the West Riding of Yorkshire, is as follows:—

Average consumption of gas per consumer per annum 21,128 cu.ft.
Average consumption of gas *per capita* per annum . 6,117 ,,

TABLE 4.—*Analysis of Numbers of Consumers* not *using the Multiple Tariff.*

Per Quarter. Cu.Ft.	Domestic. Scale 1.	Industrial and Commercial. Scale 1.	Coin. Scales 4 and 5.
1	2	3	4
Up to 4,000	10,558	1,549	7,524
4,000–8,000	3,523	753	3,130
8,000–12,000	441	525	838
Over 12,000	311	482	52
Total	14,833	3,309	11,544

TABLE 5.—*Gas and Electricity Undertakings operating in the same Area, both under the same Municipal Administration.*

—	Gas.	Electricity.
1	2	3
Net debt per consumer	£6 11s. 2d.	£36 11s. 2d.
Rates, rents, taxes, interest and sinking fund per consumer per annum	£1 10s. 7d.	£3 8s. 10d.
Commodity cost, pence per unit sold	0·125 (per unit of 4,000 B.Th.U. gross)	0·248 (per unit of 3,412 B.Th.U.)
Total money received, pence per unit sold	0·355 (per unit of 4,000 B.Th.U. gross)	1·376 (per unit of 3,412 B.Th.U.)
Average number of units consumed per consumer per annum	2,775	2,833
Average number of units consumed per inhabitant per annum	830	419
Average amount paid per consumer per annum	£4 2s. 0d.	£13 11s. 4d.
Average number of units consumed per inhabitant per annum—in the British Isles	754	245

THE NATIONAL GAS BOARD.

The statutes governing the supply of public utilities are in urgent need of reform. In electricity supply, the municipal and company undertakings enjoy an equal measure of freedom. In gas supply, there are serious and hampering restrictions, and these restrictions vary as between municipal and company undertakings.

The Gas Industry is entitled to the freedom extended to electricity supply undertakings.

The process necessary to obtain sanction to regulate the basis upon which the price of gas is fixed could be simplified. This is a domestic question, and one which could be settled at a round table comprising the interests concerned, just as questions concerning wages and conditions of labour are settled by the Industrial Council.

The Industrial Council, as at present constituted, could, with the addition of consumers' representatives, appointed by the Board of Trade, deal impartially and satisfactorily with all questions affecting the price of gas.

The consumers' representatives might well be chosen, as parliamentary committees are chosen, from the members of Parliament who have had experience in local government.

Thus would be constituted a "National Gas Board."

POLICY AND PERFORMANCE IN

The Development of Gas Sales

by

SAMUEL B. CHANDLER,

Distribution Superintendent of the Tottenham and District Gas Company

S. B. CHANDLER, A.M.I.Mech.E.

Mr. Samuel B. Chandler is the eldest son of the late Samuel Chandler, Chairman of Kirkham, Hulett, & Chandler, Ltd. He was educated at the City of London School and received his engineering training with S. Chandler & Sons, of Kennington. He entered the service of the South Metropolitan Gas Company's Distribution Department in 1907, being subsequently appointed to organize the Sales Department of the South Suburban Company in 1913. He was appointed to his present position, in control of the Distribution Department of the Tottenham and District Gas Company, in 1923. Mr. Chandler is also a member of the Institution of Heating and Ventilating Engineers, and is Chairman and Assessor of the Gas Supply Panel of Examiners of the Institution of Gas Engineers Education Scheme.

PERSONNEL.

The growth of the Gas Industry and the value attached to the utilization of gas by the public have combined to increase the importance of the Sales Department as a direct means of increasing output and maintaining sales. With the discovery of further uses to which gas may be put—in fashion hitherto unthought of, such as submerged combustion, space and central heating, cremation, refrigeration, incubation, &c.—and the introduction almost daily of new types of apparatus, particularly in the industrial field, the necessity for technically trained representatives has become extremely important.

The channels from which assistants of this kind are obtained are limited, and the best course is to obtain the "raw material" from technical colleges, polytechnics and secondary schools, and by setting up special courses of training, to prepare and fit the recruit for his future position.

This need was long ago realized at Tottenham, and in 1925 a scheme of apprenticeship was set up which has not only been very successful, but is extraordinarily simple in operation.

Many undertakings have, of course, adopted apprenticeship schemes of the character described below, and the author describes the one with which he is connected in order to emphasize the value of such schemes to all concerned.

The Tottenham scheme is divided into two sections—"A", Gas Distribution Apprenticeship Scheme, and "B", Gas Fitters' Apprenticeship Scheme.

The Gas Distribution Apprenticeship Scheme is for those whose educational attainments are likely to fit them to take up positions of responsibility as inspectors, district, industrial and special representatives, showroom attendants and salesmen; each youth must either have matriculated or possess exemption qualification.

The Gas Fitters' Apprenticeship Scheme is designed for those whose future activities lie in the ranks of the fittings staff, viz., foremen and the various classes of fitters. These youths are drawn from technical schools having practical workshop practice as part of their curriculum.

Apprenticeship is for five years or such period as will release the apprentice on attaining the age of 21 years, during which time he is paid a wage, commencing at 15s. per week and rising to 40s. per week at the age of 21, subject to approved and satisfactory progress being made. Probationary period is, in the case of the "A" Scheme, six months, and, in the case of the "B" Scheme, three months, the Company reserving the right to cancel the arrangement within these times from date of entry, should the apprentice not prove satisfactory. Indentures are not confirmed until the probationary periods have elapsed.

Apprentices undertake to attend classes, both practical and theoretical, which have been set up by arrangement with the Tottenham Polytechnic and Hertford Evening Institute or other approved centres, and they are encouraged to take The Institution of Gas Engineers examinations in Gas Supply and/or Gas Fitting, in order to qualify for future responsibilities. Class and examination fees paid by students are returned by the Company upon evidence being produced that 80 per cent. attendances have been made.

Upon the termination of his apprenticeship, the "A" youth is transferred to the district as an acting assistant either in the showroom or with an inspector, and not until he has passed his Ordinary Grade Gas Supply examination is he confirmed as an assistant; the passing of the Higher Grade examination entitles him to full rank, provided always there is a position available.

The "B" youths become "mates" at the end of their period of apprenticeship and are promoted to second-class fitters as vacancies arise. At this stage, having completed five years' service and reached 21 years of age, they come under the provisions of the London Regional Council's Gas Fitters' Classification Scheme, and promotion to the higher ranks is controlled by their ability or otherwise to pass the various examinations set up under that scheme, subject to suitable vacancies being available in the ranks of the established fittings staff.

Since the apprenticeship scheme was commenced 37 "A" and 32 "B" apprentices have served their full time and are now engaged as industrial representatives, district salesmen, inspectors, assistant inspectors, coke fire salesmen and fitters.

With regard to examinations, the attention given by apprentices is very encouraging, and amongst those who have qualified may be numbered some who have secured distinction and in one case a silver medal. The knowledge thus gained and put into practice is of great value and definitely justifies the appointment of a personnel drawn from an apprenticeship scheme of this kind.

The scheme has the merit of simplicity of organization and its application to small undertakings with perhaps minor modifications is quite a feasible proposition having regard to the ease with which it can be put into operation; it certainly does produce very useful material, and is, in the author's view, a most efficient means of building up a competent staff.

The almost daily introduction of appliances, devised for the more efficient use of gas and often involving new devices and novel designs, makes it necessary that those whose business it is to introduce them to the consumer shall have intimate knowledge of their construction, performance and suitability; in order that this information should be available a system of tuition and explanation is necessary—indeed imperative—if the representative is to speak with any authority upon the subject. The setting up of classes by an undertaking is a useful and convenient way by which such knowledge can be transmitted, and the author has found that periodical attendance by the sales, inspecting and fittings staffs at lectures of both a practical and theoretical character, given by a competent member of the staff, has been helpful. Considerable interest has been

aroused and knowledge acquired which is of undoubted assistance to the representative and salesman.

PRESSURES.

Any system or organization set up to meet district requirements however ably administered must fail unless an ample supply of gas can be maintained over the whole area.

The manufacture of gas has now reached the stage when one can feel assured that, generally speaking, quality, composition, specific gravity and calorific value remain fairly consistent, and provided the consumer can depend upon adequate pressure all the factors which determine a satisfactory supply are available.

At Tottenham the matter of pressures has been dealt with by the installation of 16 district governors situated at various points on a system of feeder mains. All governors are coupled with Widlake recorders. Certain of them are situated at the extremities of the trunk supply mains and the ungoverned open ended trunk supply mains are also fitted with the Widlake apparatus to indicate that an adequate supply is reaching the extremities. All other intermediate governors are fitted with similar apparatus, which gives outlet records at the Works where the recorders are installed, so that it is possible at a glance to see that the whole of the area is being adequately served.

Outlet pressures at all terminal and governed points are maintained at 6 in. w.g. This pressure combined with the tactical positions at which the outlets feed the district gives an extremely even pressure over the whole of the area of supply.

The installation and operation of the governors and recording apparatus were very fully described in a Paper, "Extensions and Modifications in the Tottenham Distribution System," presented by Mr. H. C. Smith, at the 65th Annual General Meeting of The Institution of Gas Engineers in 1928, and attention is directed thereto.

EMERGENCY SERVICE.

Emergency calls made during the hours when fitters are normally off duty are an important factor in the organization of the district; it is very necessary that competent fitters should be available throughout the day and night in order to give the fullest service to the consumer.

With the growth of the Tottenham and District Gas Company's area it became necessary to reorganize the system previously in operation dealing with emergency calls.

Previously when an urgent call was received the duty of the district inspector was to seek out a fitter or service layer as occasion demanded, certain members of the fittings staff taking turns by remaining at home after working hours, for which duty a retaining fee was paid irrespective of any work done. These emergency rota fitters, when on duty, retained a skeleton kit of tools at home and were immediately despatched by the inspector to the premises requiring attention.

Upon the removal of the Company's chief office to Woodall House the system was discontinued and a mobile emergency section formed.

Its importance, viewed from the standpoint of service to the public, warrants further particulars being given, particularly as experience extending over a year or two has shown that the scheme is one which is easy to institute and to operate, and is an effective means of remedying complaints which otherwise might assume serious proportions.

The district has been divided into two areas (North and South) and in order to assure the services of an inspector between 5.30 p.m. and 8 a.m. and on Sundays and statutory holidays one inspector on each area is at call at these times, under a rota arrangement and for the purpose of directing and supervising any operations with which it may be beyond the ability of the fitter to deal.

The emergency staff comprises two fitters, drawn from the Company's permanent staff, who attend for duty at Woodall House at 5.30 p.m., remaining until 12.30 a.m., after which one fitter only is on duty until 8 a.m.

Fitters are paid at shift rate and the arrangement allows for their employment during the daytime when not engaged on rota duty.

The equipment comprises two Austin 7 H.P. motor vans, fitted with canvas meter carriers and road opening and gas fitting tool kits; upon receiving a call either from the police or the public, the fitters immediately proceed to the site, deal with the complaint and effect the necessary repairs.

The work varies greatly and includes meter exchanges, making good escapes, releasing wedged coins, repairing or dismantling damaged lamp columns, &c. The area covered is approximately 62 square miles and under the arrangement a fitter can be in attendance with the necessary equipment at the furthest point from the centre, within 35 minutes of the time of call.

The system operates remarkably well and so far as can be seen meets all district requirements. The fact that a service of this nature is available at all hours of the day and night is reassuring and, known as it is to public and police authorities, is very helpful in dealing with all emergency cases.

CANVASSING.

The employment of canvassers or district salesmen and the payment of commission upon business secured as a result of individual effort is to be commended and is worthy of serious consideration. The opportunity which presents itself to the individual of adding to income in this way undoubtedly brings forth the maximum effort and is productive of excellent results.

The payment of commission is often regarded with disfavour, it being argued that adequate standard payment, together with the advantages of permanent employment, co-partnership, pension, &c., common in the Gas Industry, should produce results which cannot be improved by the stimulus of adding to income in this way; and from a moral standpoint this may be quite correct. Practical experience, however, not in the gas business alone but in many fields of industry proves that the principle of "payment by results" does provide an impetus by which even the keenest representative is directly encouraged.

There is need for an intensive canvassing campaign throughout the whole Industry. At the present time activity of this kind is most requisite and a system of payment based upon an adequate wage *plus* a reasonable commission will produce fruitful results, creating inevitably a demand for modern gas apparatus.

It is common knowledge that there is in existence a very large number of inefficient and out-of-date appliances, still in use and about which the user has not complained as he assumes that the service he is obtaining is the best he can expect. Unless attention is drawn through the agency of personal representation, which is after all the best form of service, to the possibilities of gas when utilized through the medium of modern apparatus, such a consumer remains in ignorance of the extraordinary advances which have been made, and when approached is quite willing to consider appliances utilizing other forms of energy.

Personal contact with the consumer is absolutely necessary if the Industry is to hold and extend its business. This relationship is, of course, already being maintained by many undertakings—but there seems to be an absence of definite policy and the author fears that in consequence many consumers are neglected.

Obviously an organization of the kind suggested cannot be put into operation without some cost, but it is well worth while, and indeed unless something of the kind is developed much ground will be lost in these days of expert salesmanship. A properly organized scheme applied by every undertaking however small would be of definite value to the whole Industry. Its application is an easy matter and the expenditure entailed would be low in proportion to the results obtained.

The principle of salary *plus* commission has been carefully studied and developed at Tottenham and results are definitely encouraging. An explanation of the organization will reveal its simplicity.

The district is divided into areas and a salesman detailed for each section. He is periodically furnished with addresses, upon which he is to call, by the Distribution Records Office situated at the Head Office. Each call is presaged by an introductory letter sent two or three days ahead; in order to overcome difficulties likely to arise if the salesman is prevented from maintaining his average of 10 to 15 calls per day, the letters are prepared, placed in stamped envelopes and sealed and given to the representative so that he may himself post them. By this means no undue time is lost between the receipt by the consumer of the letter and the call of the representative. This is regarded as an important feature.

Each letter given to the representative is accompanied by a card upon which has been entered a record of all gas appliances known to be already installed at the address in question. Provision is also made on the card for the representative to report the existence of any additional gas appliances which he may find in use, as well as for him to indicate every medium of energy employed by the consumer, *i.e.*, gas, electricity, coal or coke.

It is found the average number of calls which can be made is 12 per day. Each representative is supplied with a form upon which he makes a weekly return of business transacted, including a record of apparatus exchanged, complaints, &c. These cards are checked in the Distribution Records Office and passed to the Accounts Department where they are held until all the transactions referred

to are actually completed; they are then checked and payment of commission is authorized.

The representative when calling takes the opportunity of inspecting the whole of the appliances on the premises and makes suggestions as to improvement, generally placing himself at the service of the consumer. The amounts of commission paid vary according to the class of appliance placed and are from 2s. 6d. for a gas cooker to 1s. for a gas iron. Commissions are halved where appliances are rented and no commission is paid upon exchanges. All classes of appliances are dealt with.

It is hoped to extend the system in the near future as it is felt that it is well worth while and a valuable means of maintaining the consumer's goodwill, bringing his apparatus up-to-date, and satisfying his requirements.

CONSUMER'S SATISFACTION.

The desirability of obtaining information regarding new apparatus installed, and the opinion of the consumer as to his satisfaction with installation and performance, is necessary, if only in order to ascertain the value placed upon appliances by the users and their views as to the service rendered by the undertaking.

To attain this end and to encourage the consumer in the view that the gas undertaking is anxious to render the best and most useful service, the following scheme was put into operation in Tottenham in 1923, and an examination of its working indicates the value which may be attached to a service of this kind, particularly when outside contractors are employed to undertake work on behalf of the Company.

Upon completion of transactions involving installation of appliances, either by sale or hire, the counterfoils with the work tickets are sent to the Records Office for registration purposes. A fortnight after completion of the order a letter is sent to the consumer inquiring whether the appliance is giving entire satisfaction, a stamped addressed postcard being enclosed for reply.

If no reply has been received after a fortnight has elapsed, a further card is sent asking for a reply to the earlier letter, and if this is still not forthcoming, the matter is referred to the Depôt Inspector and a representative calls upon the consumer to obtain the required information.

In addition to the information asked for, it is very often found that the consumer makes use of the card to inquire for particulars of further apparatus, report small defects on previously existing appliances, make requests for the attendance of a representative, and generally utilizes the card as a means of communicating some request for information.

The influence of the scheme is widespread and very useful in bringing to light lesser as well as greater matters which interest both consumer and company.

To indicate its value it may be said that during 1934 the total number of letters sent out, excluding reminders, was 28,800. The number sent out per annum is, of course, larger than when the scheme was inaugurated 12 years ago, and from available records it is estimated that the total number of inquiries sent out since the arrangement commenced is about 260,000. Examination of results reveals that approximately 95 per cent. of the replies denote satisfaction, sometimes qualified by expressions of appreciation.

The arrangement has the advantages of economy and simplicity in operation, and represents a further service to the consumer, which is welcomed and appreciated. To enlist his co-operation and to encourage a frank expression of his views upon the utility of the apparatus installed is an important objective worth considerable effort to stimulate. Apart from ascertaining the consumer's views, the practice establishes a feeling of confidence and is an expression of the desire to serve and the interest taken by the undertaking.

SHOWROOMS.

In so far as personnel is concerned, there is still need for skilled showroom salesmen and saleswomen in the Industry. The many educational and other facilities now available to the public have resulted in a far more enlightened and discriminating type of customer than heretofore, and have made necessary the employment of only those who possess special and definite qualifications. It is gratifying to know that at long last the Industry has realized that somewhat special attributes are needed to evolve the successful showroom attendant.

The training of sales staff is very materially assisted by the Domestic Gas Salesmanship Course recently set up under the ægis of the British Commercial Gas Association. Although of a correspondence character, it is so framed that very useful information can be assimilated and with proper study the examination may be passed. The scheme has been taken up enthusiastically by the staff of the Tottenham and District Gas Company and in order to obtain the greatest advantage the following procedure has been adopted.

Upon enrolment of candidates, a group leader is appointed from amongst them, who undertakes the responsibility of keeping in touch with the British Commercial Gas Association and who arranges periodical meetings when the subject matter is discussed and experimental transactions dealt with in a practical way. The arrangement is very successful and up to the present time has resulted in 30 students securing certificates.

The introduction of women sales attendants is a new and desirable feature. An analysis of consumers calling at gas showrooms will disclose that in the majority of instances it is the woman who ultimately decides the apparatus to be supplied, and there would seem to be ample justification for the view that a female attendant can much more easily talk upon matters touching domestic life, colour schemes, &c., and can influence business more effectively than a person of the opposite sex, particularly if she is able to discuss in an intelligent way the uses to which gas may be applied in the home. In the opinion of the author it is a positive advantage to utilize the services of at least one female attendant in every showroom.

In addition, the feminine touch would be useful in the tasteful dressing of both showroom and windows, for the public is undoubtedly affected by the appearance of the "shop window."

INDUSTRIAL DEVELOPMENT.

Of late years development of the use of gas in industrial operations has engaged the particular attention of the Industry. Recognition of this aspect of supply has resulted in the formation of District Industrial Gas Development Centres and a Central Information Bureau, which conveniently collect, pool and distribute technical data and information, opening the way towards unification of action and application with a strengthening of the Industry's efforts to extend the use of gas for industrial purposes.

The support already accorded the new Centres—over 200 undertakings having already joined—is very encouraging. The way is now open for the small undertaking to obtain expert advice and information in respect of industrial problems at little cost. Manufacturers are more and more looking to local gas undertakings for advice upon all phases of industrial work and, what is more, if they can be convinced as to a representative's capabilities, will consider his proposals and are likely to adopt schemes laid before them.

Migration of factories from the north to the south, the setting up of branches of foreign manufacturers in this country and the general improvement in trade conditions, lead one to the view that for some time ahead activity will be considerable. Brisk trade means overhauling, modernizing and extension of plant, and the abandonment of old methods in favour of modern processes in most of which a use can be found for gas. In addition to thermal qualities, plant must look well and conform to the present-day need for neatness and symmetry; the position of the Gas Industry in this respect has been strengthened in recent times by the attention which has been paid to design in particular, and tribute must be paid to the Gas Light and Coke Company, which has done so much in this direction. It may be conceded that in the area of every undertaking there is a potential industrial field, possibly small, but nevertheless deserving attention.

Considerable activity in the industrial application of gas in the Tottenham area has been brought about by the opening up of the Cambridge Arterial Road, the formation of building frontages with easy traffic facilities, the development of parcels of land adjacent to the road, rail and water conveniences and the tendency for factories to be built near London.

Anticipating that a situation of this kind was likely to occur, and taking into consideration the large number of existing factories, a department was set up to deal with matters of this kind, and it was soon made apparent by the marked increase in business both from existing factories, of which comparatively little was known, and from new factories opening up that special attention to this load was very necessary.

Prior to the formation of an Industrial Department it had been the practice to treat commercial firms more or less as ordinary domestic consumers, and when a census was taken we were agreeably surprised to discover the great variety of operations being carried out and the valuable potential load, much of which has since materialized.

As a complement to the Technical Staff it has been found necessary to provide a draughtsman and workshop facilities to design and produce isolated pieces of equipment for which duty no standard plant is available; although gener-

ally the practice of actual construction is not considered wise and is only resorted to as a last expedient.

So far as maintenance and fitting work on the district are concerned, special men are reserved for these duties, for it is considered that, as in the case of the technical staff, specially trained mechanics are necessary if the benefits accruing from carefully planned schemes are to be fully realized.

As an indication of the value of a department of this character one instance is here given where, as the result of many calls by a representative at a plastic moulding works at Edmonton, objections previously held to the use of gas as a heating agent for presses were completely overcome. The management had been dissatisfied with gas, and electrical equipment for the moulding presses had been proposed. After some difficulty the Company was permitted to carry out experiments on one press and as a result the average gas consumption was reduced with the new burner equipment from 82·6 cu.ft. to 58 cu.ft. per hour; the period of initial heating was also cut down and a considerable increase in production efficiency was obtained. This so impressed the management that further presses were dealt with and an order was ultimately received for the conversion of 39 moulding presses.

It will be noted that the gas consumption on this particular plant has been reduced by nearly 30 per cent., but on the other hand it has so encouraged our consumers that we are hopeful of converting the coke fired central heating system to gas and in addition further new moulding presses are to be served with the burner equipment.

The Tottenham and District Gas Company grants substantial discounts on heavy loads, which enables it to take a fair proportion of the industrial heating business available; not by any means so much as it would like, but much more than it would take if no attention were paid to the economical application of its product. It is realized that our fuel is a refined one which lends itself better than any other to high efficiencies and easy operation, and full advantage of these assets is taken to find markets at an economic price.

DOMESTIC LIGHTING.

The almost universal use of gas for kitchen and general domestic purposes has in some quarters contributed to a lack of confidence and enthusiasm as to its merits for purely lighting purposes, and a tacit acceptance of the decline and possible ultimate loss of this load.

More serious attention should be given by the Industry to gas lighting and greater efforts should be made to place before the public the claims of gas for this particular purpose.

A visit to the showrooms of many undertakings is disappointing from the fittings point of view for often no attempt is made to present the case for lighting in a favourable manner; the appearance and quality of fittings, burners and glassware leave much to be desired and emphasis is given to the view that gas lighting is regarded as of little, if any, importance. This is a state of things which must be remedied if fruitful results are to be achieved; and to some extent it may account for the preference shown by the public for electricity.

A factor which adds weight to electrical prejudice is the attitude adopted by those undertakings who accept the loss of their lighting load with surprising equanimity and who take the line of least resistance by ceasing to trouble themselves in the matter. The author does not altogether share the opinion often expressed as to eventual loss of lighting which he believes is one of pessimism and a want of faith. Whilst admitting keen and virile opposition, he believes much could be done to retain existing lighting and in some cases to obtain new installations were the claims of gas more widely broadcast and were closer touch and co-operation maintained with manufacturers.

In new premises the preference for wires rather than pipes for lighting service is patent to all concerned with distribution and sales matters. This partiality is unlikely to be easily diverted and it behoves the Industry as a whole to investigate further ways and means whereby the use of gas for lighting purposes may be developed in every new house. The following suggestions are given by the author as presenting potentialities which may assist to this end:

(*a*) The provision of properly designed fittings, with switch control, for kitchen and bathroom, these being the most used rooms in the average house; the piping and fittings to be installed without cost to owner or builder, on the understanding that the lighting is exclusive.

(*b*) A conference of leading distribution officials specially to consider public, commercial and domestic lighting matters, in order to evolve a policy and a co-operative form of action to be taken by the Industry as a whole.

(*c*) Encouragement of staffs to take an intelligent and practical interest in local civic activities, *i.e.*, chambers of trade and commerce, rotary and other clubs and associations, and, where politic, their representation upon local councils.

With regard to this last suggestion, one is of course aware that in many instances this course is now followed with great benefit to undertakings; it is, however, by no means universal. From practical experience, the presence of gas officials amongst such public bodies as those mentioned is productive of very good results, personal contact being possibly the best form of advertising—a fact of which our electrical friends take very full advantage. An intelligent representative in constant contact with local business men and council officials can do much to further the work of his undertaking.

The attitude of insularity which was once prevalent has long since passed, and undoubtedly personal contact is necessary and will be effective not only in maintaining good relations between the public and undertaking, but in furthering the objects all have in view.

PUBLIC LIGHTING.

The day has passed when public lighting can be carried on by "rule of thumb", and the present era demands scientific, practical and theoretical knowledge in application—for practically every road has its special requirements—not only to comply with the British Standard Specification but also to meet local needs and the stringent economy which some local authorities unfortunately seem to consider a prime factor where gas is concerned.

It has been the regrettable practice of some local authorities not only to scrap old and antiquated installations which could be modernized and brought up to date with increased efficiency at very reasonable capital outlay and without additional annual charges, but also to condemn the illuminant itself on the performance of the existing installation. It may be affirmed, without fear of contradiction, that gas as an illuminant for street lighting cannot at the present time be excelled; the light required for streets is that which most resembles daylight, and as gas lighting covers the spectrum to a far greater extent than any other artificial illuminant it is admirably suited for such service. The Industry can therefore offer the finest quality of light obtainable at an economic cost and, providing maintenance is good, nothing but prejudice can permit acceptance of any other.

Competition is an effective method of attaining the highest standard of efficiency, and providing that that which one has to meet is fair, unbiassed and unprejudiced, the Industry has little to fear.

Since the war the subject of public lighting has come into great prominence, not only by reason of competition but also because it is realized that adequate street lighting is a prime factor in the safety of roads rendered more dangerous by increased use and fast moving traffic. The Government, local authorities and the public are now fully alive to the fact that the lighting of streets must play an important part in the amenities of our cities and towns, and also has a direct influence in the safeguarding of lives and property.

Advances made by manufacturers of street lighting lamps and fitments are obvious and very encouraging. Quite apart from the question of lighting efficiency, the matter of design is not to be disregarded and it is pleasing to note that features having some architectural merit and more in keeping with modern requirements are now being employed. Very little change had taken place in lamp design until quite recently and it is to be hoped that manufacturers will continue their efforts not only to improve the quality of their product, but to study the æsthetic standpoint which is deserving of thought.

The Tottenham and District Gas Company prepared early to deal with what is now a highly technical branch of the Industry. Conditions of application are continually changing and height, spacing, positioning, burners, shades, directional reflectors and refractors have to be studied and applied. Each refinement plays an important part and has the effect of improving illumination, not necessarily at increased cost but in many cases by similar or even reduced annual charges due to the fitting of modern apparatus in the correct manner.

Certain instances stand out as representative of what may be accomplished. The first is the Cambridge Arterial Road, Figure 1, 10¾ miles in length, which passes through the districts of five different local authorities in the area supplied by the Tottenham Company.

After extraordinarily severe competition each one of the Councils concerned selected gas as the illuminant and long

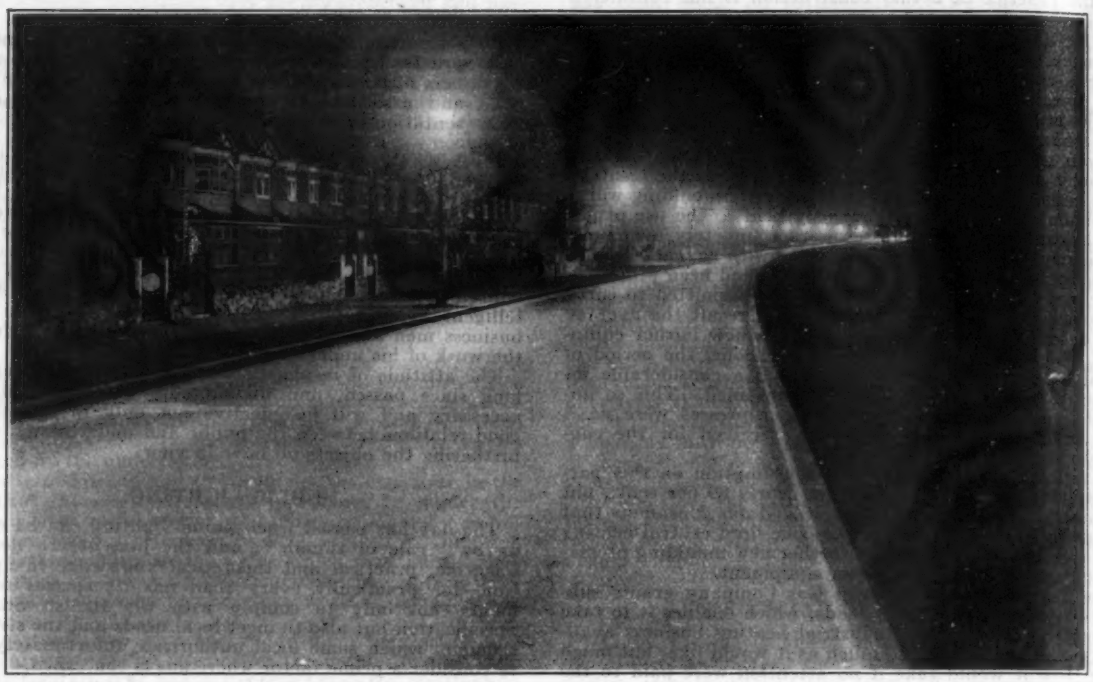


FIGURE 1.—*Modern Gas Street Lighting, Great Cambridge Road.*

term contracts varying from five to seven years were secured. Sections of the road are already lighted by 333 6 lt. No. 2 Rochester lamps and additional lamps are being erected in the Cheshunt section as building development proceeds.

The second example is that of Westbury Avenue, Tottenham, Figure 2, where a seven years' contract was obtained. This road was previously lighted with 2 lt. No. 2 lamps mounted on 9 ft. 3 in. columns; the Company, having secured the order for the re-lighting, installed 6 lt. No. 1 upright fixing Rochester lamps spaced 100 ft. apart on 12 ft. columns.

The lighting of all main roads in Waltham Cross and Cheshunt has been modernized. These roads were previously lighted by 2 lt. and 3 lt. No. 2 lamps and a few 6 lt. No. 2 Rochester lamps from dusk to 1 a.m. and from 5 a.m. to dawn. The new lighting is by 8 lt. and 6 lt. No. 2 Rochester lamps, the total number being 154. This more than doubles the lighting from dusk to midnight and a previously unlighted period from 1 a.m. until 5 a.m. is now abolished. In all cases the lamps are fitted with stainless steel multi-faced directional reflectors.

The partiality on the part of some public authorities for the lighting of streets by electricity is perhaps difficult to understand having in mind the obvious superiority of the quality of light flux and the penetrative character of gas lighting, as compared with the periodical failures of electricity, which create danger, inconvenience and confusion for those who are dependent upon a constant supply of energy.

The electricity grid system has been glorified by its protagonists and in the Press of the country as representing a complete answer, so far as lighting and power requirements are concerned, to the country's demand for a cheap and abundant supply of energy. These rosy prognostications are as yet far from realization and in the interim the patience of the public is sorely tried by recurring breakdowns. The explanations given for these failures are hardly reassuring to the public for, after serious assurances have been given in, amongst other places, the House of Commons to the effect that such conditions cannot occur again, they remain, like the poor, still with us and are apparently inseparable from this form of public service.

In addition to efficient lighting of streets the colour effect of the illuminant plays its part in contributing to the comfort or otherwise of pedestrian and motorist. There can be no question that a system of low or high pressure gas lighting does possess distinct advantages from the light flux and colour aspect and creates effects of warmth and comfortable conditions which must add to the pleasure of pedestrian and driver, and have the merit of reliability.

Illuminated by one of the latest electric lighting systems, the colour of the human skin is changed to an unhealthy, leaden appearance of a rather disturbing character. In roads so lighted the normal greeting of friends might well be "How ghastly you look!" Ultimately a road lighted in this way would be avoided at night, and the result from a trader's point of view would be unsatisfactory.

It may be thought by some that criticism of alternative forms of illumination is uncalled for, but the author feels that an opinion such as is now expressed is reasonable comment; particularly is this so in view of the impression that on occasion street lighting schemes presented by the Gas Industry to local authorities have not always received that consideration which their importance deserves, and that questions of installation, running and maintenance costs, if not altogether ignored, have been dealt with in a perfunctory manner.

It would seem also that the general body of ratepayers has very little voice in deciding the form of illumination which shall be adopted, although, of course, they have to "foot the bill," and it does appear that a more intelligent interest taken in civic matters by Ratepayers' Associations, Chambers of Commerce, and other local bodies might produce results more in keeping with the real wishes of the public.

The Gas Industry does not fear but rather welcomes healthy competition and is always satisfied, whatever the issue may be, provided the result is based upon and comes about after fair, impartial and unbiassed consideration.

FLOODLIGHTING.

Floodlighting for spectacular, commercial or decorative purposes received attention at Tottenham before any recognized floodlight or concentrated beam-lamps were normally manufactured.

One of the first ventures was to fit magnifying bull's eye attachments to public lamps to throw beams of light on to buildings and point policemen, &c. In 1928 was erected an installation of such lamps, also equipped with parabolic shades to screen the light from the line of vision, for the floodlighting of a publichouse; in this particular instance it is interesting to note that apart from these lamps no other gas lighting was used at this house. The installation is still in use.

With the various types of gas floodlamps now available many interesting experiments have been carried out, including the floodlighting of the head office, Woodall House, the floodlighting of Bruce Castle including the grounds, flower beds and trees during Charter Celebrations in Tottenham, the floodlighting of large works, swimming pools, advertising signs, &c.

The future of this special type of lighting, in so far as its application for purely ornamental and spectacular purposes is concerned, is of questionable value to the Industry. Whilst many excellent installations have been made, they are in most cases merely of temporary and topical interest only showing what can be done in this way.

Permanent forms of floodlighting of real usefulness should

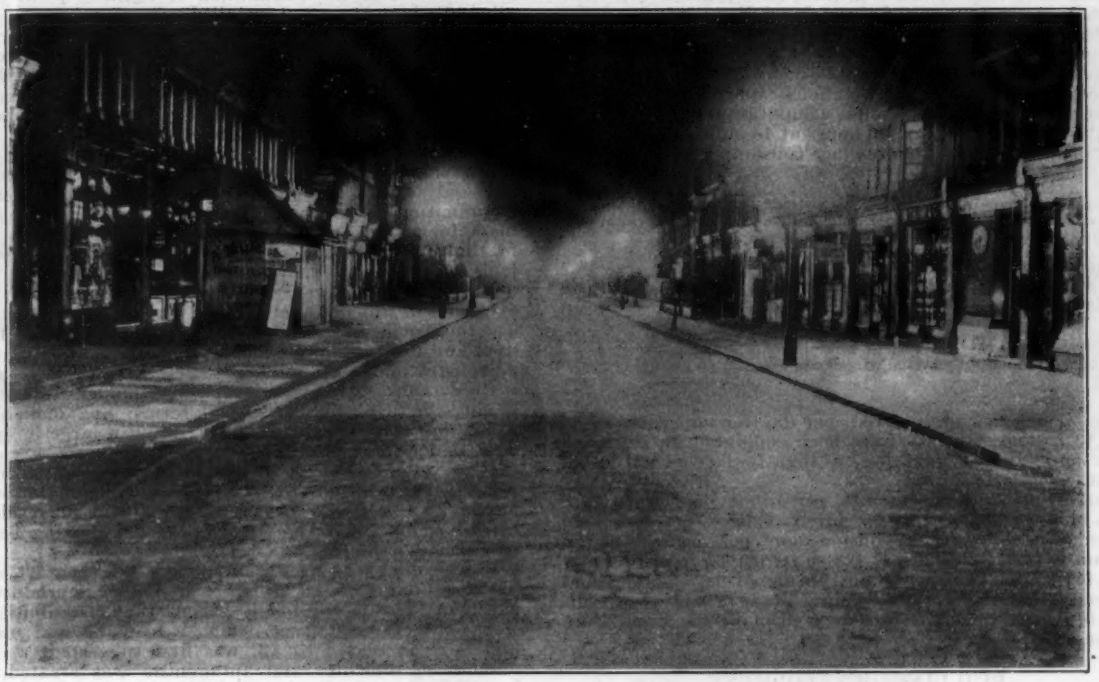


FIGURE 2.—*Modern Gas Street Lighting, Westbury Avenue, Tottenham.*

be found if this potential output is to be made effective; particularly the illumination of public signs, advertising boards and other more permanent objects such as places of public recreation, open spaces, open-air swimming pools, &c., to which the attention of the public is continually drawn. At the Enfield Swimming Pool, one of the largest in the country, a complete floodlighting installation has been most successfully applied, and is very favourably commented upon; this is of a permanent nature and is continually before the public as an example of what can be done by gas. In this particular instance very strenuous electrical competition had to be faced and it was only by the tenacity of the department concerned that the installation ultimately was secured for gas.

Efforts should be made to encourage advertising contractors to utilize the Industry's services in this way. In the author's view a special effort might have very encouraging results.

WATER HEATING.

Impetus in the important matter of water heating has been accentuated by the activities of our electricity rivals in endeavouring to persuade the public that water heating can be most economically and successfully carried out by electricity; and the introduction by the electrical industry of the immersion heater as applied to the storage system of water heating has permitted electricity to be adopted in some instances for this purpose, especially where " all-in " price tariffs are in operation. The instantaneous type of appliances of the multipoint or bath-geyser type, however, cannot be successfully applied with electricity as the heating agent, and stress should be laid upon this particular form of gas service, and every endeavour made to encourage its adoption.

Regard must, of course, be paid to the effect upon distribution systems of a large number of high-rate consumption appliances, and one can conceive that, where they are in use in any number and connected to mains the capacity of which is already tried by a high load factor, a difficult position might arise only to be met by expensive relaying. Thus, whilst heaters of the storage type are undoubtedly the most convenient from the distribution aspect by reason of their comparatively low hourly consumption, the system may not perhaps be so useful or forceful from the competition standpoint.

It will be obvious to many that great improvements in instantaneous water heaters have been effected in recent years both as regards control, working efficiency, design, appearance, ease of operation and simplicity of maintenance, and the Gas Industry has in this type a speciality and is able to offer a unique service.

It is not, of course, suggested that instantaneous water heating is the only effective method. There are undoubtedly many cases for which the storage system is particularly suitable, but in face of competition gas obviously starts off in a much stronger position if it has something to offer which can only be approached with difficulty by its competitor, and it seems that in this particular instance the utmost use should be made of the inherent advantage of gas.

Experience over the past few years has shown that instantaneous water heaters are becoming increasingly popular with building contractors; in the opinion of the author the ideal system is undoubtedly a combination of the multi-point gas water heater *plus* coke boiler. During winter months the consumer then warms his premises and heats his water by the solid-fuel boiler, and in summer he has available an immediate supply of hot water from his gas heater.

A large number of multi-point instantaneous water heaters have been installed on the Tottenham area. In order to obtain information as to the value of an apparatus of this kind on the premises of consumers taking gas through coin meters, an analysis was made of one year's consumption of gas in a number of premises where multi-point water heaters had been fixed, and compared with the consumption of similar premises situated on the same estate but without water heaters. This comparison revealed that the average additional gas used amounted to approximately 7,000 cu.ft. per annum per consumer, an interesting figure and some indication of the value of a gas-heated water supply.

The single-point type of apparatus is, from the consumers' standpoint, a popular means of producing hot water and its availability by undertakings materially assists in retaining the water heating load.

There is, however, still a large field for the storage type of heater and some consumers are intrigued by a system of rental which includes not only the cost of the apparatus and its installation, but also the gas consumed; this is an arrangement which has much to commend it. The path of the salesman is made smoother, and the case for gas stronger, when he can inform the potential user that no capital cost is incurred and that the charge includes all gas used; the actual annual cost of the service is then at once apparent. A system on these lines has been in operation for some time at Tottenham and some progress has been made. Although appliances on the district are mostly of the instantaneous type, some partiality is shown for the storage type.

The type of apparatus selected consists of a complete unit—the boiler, hot-water container and connecting pipes being housed in a cylindrical casing; the burner being of the low consumption type, *i.e.*, 10 cu.ft. per hour of 500 B.Th.U. gas. This small hourly output makes it possible to instal the apparatus without connecting the flue to the outer air in cases where space and ventilation permit. The gas supply is, of course, thermostatically controlled and the

approximate rate of heating when the burner is full on is 3·5 gallons per hour raised through 90° F.

The heater is available in three capacities, 20, 30, and 40 gallons, the daily rentals for which are 6d., 8d. and 10d.

In order to arrive at the rental charge of 6d. per day in the case of the heater of 20 gallons capacity the following figures were taken, based on a computation of the average hourly consumption, *i.e.*, 10 hours at 10 cu.ft. and 14 hours at 1·5 cu.ft., by-pass maintenance consumption.

	£	s.	d.	
Estimated annual consumption—43,800 cu.ft. at 8·6d. per therm, *less* 17 per cent. discoun	= 6	8	11	per annum
Capital charges for plant and fixing and costs, provision being made for amortization and 6½ per cent. per annum on the capital cost of apparatus, assuming a seven years' life .	= 2	3	10	,, ,,
Maintenance, 2 calls per annum.	= 0	10	0	,, ,,
	£9	2	9	,, ,,
Annual revenue—365 days at 6d. per day . .	= £9	2	6	

The charges of 8d. and 10d. per day for apparatus of 30 and 40 gallons capacity have been computed on a similar basis and give, if anything, a slightly larger margin of profit.

The estimate of 43,800 cu.ft. per annum laid down as a basis of charge has been very closely realized, being slightly exceeded; the average consumption per consumer per annum is 44,954 cu.ft., *i.e.*, 123 cu.ft. per day, a difference of 1,154 cu.ft. This may be considered satisfactory and indicates that the service is appreciated, for the conditions of rental encourage the consumer to make the utmost use of the apparatus.

BUILDING DEVELOPMENT.

The large number of buildings erected since 1919 and their effect upon gas output has been referred to in a previous section. The activities of builders, particularly those engaged in the erection of residential class property, emphasized the need for the formation and operation of special facilities to deal with the matter.

In 1930 a special Building Development Department was formed for the particular purpose of dealing with new estates. Before this, the duty of looking after the builder devolved upon the district inspector, but with an increase in building activities the problem became acute, and it was considered advisable to form this separate section, operated from one centre, in order that the Company's terms of business should be consistently and uniformly presented to each architect, builder or contractor operating within the supply area.

The particular function of the Building Development Department is to keep in touch with those concerned in estate development, placing before them the Company's terms and conditions of supply, quoting for piping of premises and the installation of both gas and coke domestic apparatus, arranging for the equipment of show houses and generally taking steps to present the case for gas in the best possible way.

It is obvious that the problem of the new tenant is simplified if gas appliances are already installed. Accordingly he is having special attention and the Building Development Section has been further extended to deal specifically with the consumer coming into the district or removing to new premises; further reference to this is made in a later paragraph.

Information as to building operations in the district having been obtained, a lay-out plan is secured from the builder of the proposed new estate; this plan is referred to the Drawing Office where it is copied to scale and the proposed new mains plotted thereon, particular attention being paid to existing mains and available pressures.

Modern road construction usually necessitates the laying of mains in duplicate, *i.e.*, under footways, and this practice, although rather more expensive, has considerable advantages, services being shorter and the main itself being more easily available with less disturbance to traffic when examination has to be made.

The builder, after making formal application for installation of mains, has to conform with certain conditions, relative to (*a*) the piping of premises and (*b*) the service charge of £3 or £5 as the case may be.

Under a Subsidy Scheme which has long been in operation and which operates very well indeed, the Company contributes part cost of piping work on the understanding that certain conditions embodied in an agreement are fulfilled.

The rates of subsidy fall into three classifications, *i.e.*,

A. Cooker, copper, geyser, and one fire . . . . 17s.
B. Cooker, copper, geyser, and two fires . . . . 21s.
C. Cooker, copper, geyser, and three fires . . . 25s.

To encourage the installation of lighting points, 5s. is allowed where these are installed.

Should the builder decide to instal fewer points than those enumerated under Class A, the contribution towards the cost of the main and service is increased to £5 per house. Instances where this has been applied are very rare as it is found that the builder is usually agreeable to instal under one or other of the classifications.

The Company undertakes to carry out carcassing work on the builder's behalf should he desire it. The subsidy is paid only upon the certificate issued by the inspector after examination of the piping in each house. No charge is made for service into premises where gas is utilized wholly for lighting purposes. The standard size of service pipe laid is 1¼ in.

On practically every estate of any size a show house is arranged in which appliances are placed and connected up. The builder in some cases makes himself responsible for gas used and the appliances, loaned free, are thus available for demonstration to the public.

Every effort is made to encourage builders to instal appliances in new houses; special terms, *i.e.*, makers' cost price *plus* 10 per cent., are quoted and a large business is done under these conditions.

It may be of interest to note that since the department was formed negotiations have been completed for supplying gas to 18,750 new properties, practically all residential, contributions amounting to over £56,000 having been received under the scheme.

Practical experience discloses that the contact set up between Company and architect or builder is productive of excellent results, although when the contribution towards the cost of service, which was in the first place £1 and later increased to £3, was first suggested, a certain amount of difficulty and antagonism was created. This has been overcome and very little objection is now raised when the scheme is put forward.

It may be truly said that all builders operating in the Tottenham area are dealt with in accordance with the provisions of the scheme and the Company is assured that each one is receiving an efficient service.

With regard to the taking over of premises by new tenants, a system has been set up whereby such information becomes available immediately premises are let or sold. Upon receipt of this, a special letter is sent out containing a form upon which an appointment can be made, and upon return of this the Company's representative gets into personal touch with the potential consumer and submits terms for gas supply and appliances.

In order further to encourage the installation of gas apparatus a discount of 5 per cent. is allowed off sale prices when appliances are ordered previous to the premises being occupied. This arrangement is of advantage to the Company as it permits fixing to be carried out much more expeditiously than when premises are furnished, and has led in many cases to orders being secured for additional apparatus which otherwise would have been postponed. This form of organization can be well recommended as an efficient means of maintaining contact between undertaking and builder.

COIN METER CONSUMERS.

Of the 133,658 consumers on the Tottenham area of supply, over 66 per cent. take gas through coin meters. Consequently special attention is given to this class of consumer in order to retain his custom and goodwill, as it is realized that this form of supply is an important factor in the maintenance of gas output. For economic and other reasons associated with modern requirements, prepayment meters are in many instances adopted by better class consumers than heretofore, and in many cases advantage has been taken of facilities to acquire high grade apparatus made possible on hire or rental purchase arrangements.

There is in addition, however, the consumer who, through lack of regular employment, capital or other circumstances, is unable to afford any form of direct payment, and for him no special avenue of purchase seems to have been generally available. In the past it is possible that this type of consumer has not had all the attention which his importance deserves and that the Industry has been rather inclined to by-pass him in favour of the consumer taking gas on a quarterly account.

As far as Tottenham is concerned, however, every effort is made to place before prepayment meter users attractive schemes and terms whereby modern and efficient apparatus may be acquired. A good deal has been done in this direction during the past few years, particularly in the development of a better class cooker than that previously supplied, which was of the unpacked type.

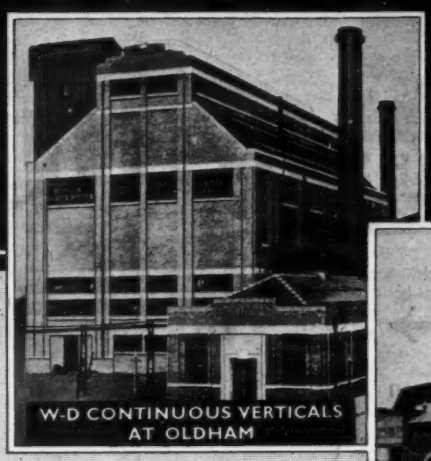
The first step taken towards improvement was that of packing the door. It was felt, however, that this did not go far enough, and in 1931 a scheme was inaugurated

CONSULT

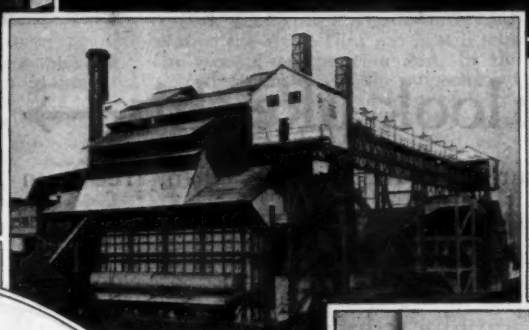
WOODALL-DUCKHAM

ON

CARBONISATION AND OTHER FUEL PROBLEMS



W-D CONTINUOUS VERTICALS AT OLDHAM



W-D INTERMITTENT VERTICALS AT TOTTENHAM

W-D SPECIALITIES

CONTINUOUS VERTICALS

INTERMITTENT VERTICALS

BECKER COKE OVENS & BY-PRODUCT PLANT

T.I.C. TAR TREATMENT

WASTE HEAT RECOVERY

LOW TEMPERATURE CARBONISATION PLANTS

COAL HANDLING & PREPARATION PLANTS

COKE HANDLING & SCREENING PLANTS

"THE WORLD OVER"

BECKER OVENS AT CORBY

W-D WASTE HEAT BOILER

T.I.C. TAR TREATMENT PLANT

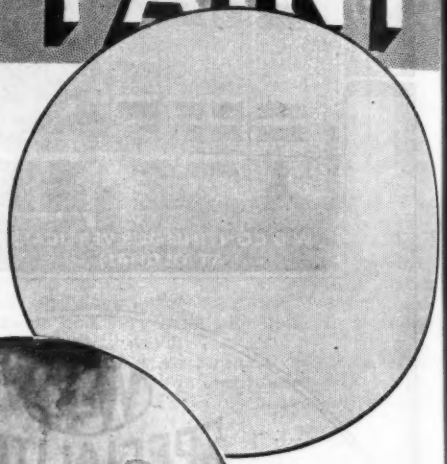
THE WOODALL-DUCKHAM VERTICAL RETORT AND OVEN CONSTRUCTION CO. (1920) LTD., EBURY & ALLINGTON HOUSES, 136-150 VICTORIA STREET, LONDON, S.W.1

MEMBERS OF THE SOCIETY OF BRITISH GAS INDUSTRIES

Time passes—*but*

DIXON'S SILICA-GRAPHITE PAINT

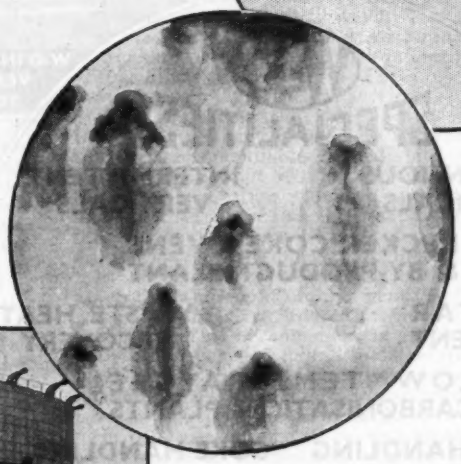
will still look like this→

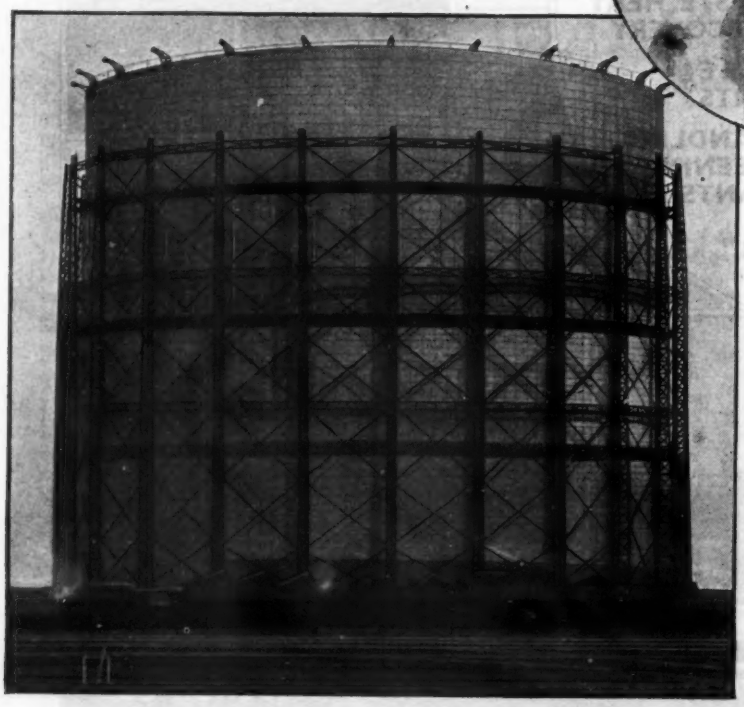


provided that the surface of the metal is clean, free from all mill scale and rust, and your first coat is put on right.

Owing to the fact that the pigments used in Dixon's Silica-Graphite Paint are absolutely inert, there is no reason at all why you should not get five years service under average conditions obtaining in gas works.

Don't risk this→





DIXON'S ALUMINIUM - GRAPHITE PAINT

For giving maximum protection this is in every way equal to Dixon's Silica-Graphite. Moreover, owing to its reflective properties the more powerful effect of the sun's rays is minimised, which makes this paint particularly suitable for crowns and top lifts of holders.

Further—

owing to the tough elastic skin which this paint makes, it is almost impervious to the absorption of water or oil—and therefore it is being successfully used for the bottom lifts of holders which are being continually immersed in water or oil.

Manufactured in London by

C. R. AVERILL LTD. 22, Duke Street, Stamford Street, London, S.E. 1

Telephone: Hop 4602 Telegrams: Crucigraph, Sedist, London

whereby consumers were offered a fully packed black enamel cooker with white vitreous enamelled door panel and modern hotplate with three burners (alternatively 2 boiling burners and grill), this being fixed complete, the coin meter being set back by two cubic feet of gas for each penny until such time as the cost was met. The sum contributed by the consumer represents the difference between the actual cost of an unpacked cooker and that of the new one, *i.e.*, 22s.

Concurrently, a modern five radiant gas fire and gas iron were offered on similar terms, except that in this case the meter was set back by one cubic foot of gas until the respective charges, *i.e.*, 45s. and 17s. 3d., had been satisfied. A gas ignited coke fire was also added to the list on exactly similar terms, the cost being 44s.

The success of the scheme may be gauged by the fact that under it the following appliances have already been placed:

Irons	1,789
Gas Fires	2 930
Coke Fires	1,593
Packed Slot Cookers	17,618
Total	23,930

These facilities are appreciated and have done something towards making the service rendered by gas to prepayment consumers more efficient.

The growing popularity of the vitreous enamelled cooker renders it advisable that its acquisition by the coin meter consumer should be encouraged and made easily possible. It is recognized that the black cooker, whilst still quite an efficient cooking medium, does not now fulfil the requirements of the present-day housewife who demands colour in her kitchen and an appliance which represents an advance on previous types, particularly in so far as temperature control is concerned.

This class of consumer is not usually in a position to purchase a cooker and it is necessary for a rather special arrangement to be made in order that purchase should be easy and the price within the ability of the consumer to pay.

With the assistance of the manufacturer the Company has evolved a completely enamelled cooker with all necessary fitments and thermostatic control at a price which makes it a most attractive proposition. To those who desire it—and there are very many—it is supplied on five years' hire purchase at 5s. per quarter. The reception of the scheme by the consumer has been more than encouraging and its popularity has been very definite.

It is felt that the opportunity which the consumer now has of acquiring an up-to-date cooker, will materially advance the claim that gas is still more than holding its own in face of competition and, in the author's view, is an excellent answer to the suggestion that only by the adoption of an alternative form of heat energy can cooking be economically, efficiently and properly conducted.

Waste Heat Recovery

FROM RETORT SETTINGS

by

Major W. GREGSON,
M.Sc., M.Inst.C.E., M.I.Mech.E.,

Technical Director of Spencer-Bonecourt, Ltd.

Major W. GREGSON, M.Sc., M.Inst.C.E., M.I.Mech.E.

Major W. Gregson was born in Monmouthshire and educated at University College, Cardiff, and at Cambridge. He served his apprenticeship with the Ebbw Vale Company, and gained further experience in steelworks at sea, serving throughout the war partly at sea and partly with the Royal Engineers, from which he was demobilized with the rank of Major. He is Chairman and Technical Director of Spencer-Bonecourt, Ltd., with whom he has been associated since 1920, particularly in connection with the development of waste-heat boiler practice as applied to the carbonizing and steelworks industries and marine oil engines. Since Babcock & Wilcox acquired the Spencer-Bonecourt share capital in 1927, Major Gregson has acted as Joint Manager of the Marine Department of the former Company.

FLUE GASES FROM RETORT SETTINGS.

The gases leaving the combustion chambers can be utilized in either or both of two ways for heat recuperation:—

(*a*) by preheating ingoing air of combustion,
(*b*) by steam raising.

The easiest way to analyse these possibilities is to first of all study the actual combustion tables for the producer gas involved.

As a basis, three assumptions are made for the calculations which follow:—

(1) a producer coke of 12,000 B.Th.U. per lb. net.
(2) a figure of 14 per cent. to cover producer losses, *i.e.*, radiation loss, uncarbonized producer fuel and ash loss.
(3) gas of the following composition:—

CO	26 per cent.
Hydrogen	9 ,,
CO_2	5 ,,
Nitrogen	60 ,,
	100 ,,

The calorific value of this gas works out as follows:—

CO	0·26 × 341 = 89
H_2	0·09 × 289 = 26
	115 B.Th.U. per cu.ft. net.

A combustion table for the above producer gas, based on 1 cu.ft. of gas burnt with theoretical air content is given in Table 1, the figures all being in cubic feet at N.T.P.

TABLE 1.—*Combustion Table for 1 Cu.Ft. of Producer Gas.*
[Figures in Cubic Feet at N.T.P.]

—		Air Required for Complete Combustion.			Volume of Products Measured at N.T.P.			
		Air.	Containing—		CO_2.	Water Vapour.	N_2.	Total.
			O_2.	N_2.				
1	2	3	4	5	6	7	8	9
CO	0·26	0·62	0·13	0·49	0·26		0·49	0·75
H_2	0·09	0·215	0·045	0·17		0·09	0·17	0·26
CO_2	0·05				0·05			0·05
N_2	0·60						0·60	0·60
—	1·00	0·835	0·175	0·66	0·31	0·09	1·26	1·66

It will be noted from Table 1 that the theoretical combustion of 1 cu.ft. of the producer gas detailed above requires ·835 cu.ft. of air, and gives 1·66 cu.ft. of products, taking water as vapour. In other words, under conditions which maintain when the waste gases leave the combustion chambers of retort settings, *i.e.*, theoretical combustion conditions, to obtain the requisite carbonizing temperature, there is practically double the volume of products compared with air of combustion, which in turn means that even with 100 per cent. effective regeneration, only some 50 per cent. of the total sensible heat in the waste gases can be taken up by the ingoing air of combustion. This is a most vital factor in the study of waste heat recovery, as it shows the practical limitations of regeneration when firing with a low-grade fuel-gas.

Table 2 gives corrections for excess air percentages.

TABLE 2.—*Corrections for Excess Air Percentages.*

Excess Air. Per Cent.	Total CO_2.	Total O_2.	Total Volumes.		Percentage—Water Condensed.*	
			Water as Vapour.	Water Condensed.	CO_2.	O_2.
1	2	3	4	5	6	7
0	0·31	..	1·660	1·570	19·7	..
50	0·31	0·087	2·078	1·988	15·6	4·37
100	0·31	0·175	2·495	2·405	12·8	7·25
150	0·31	0·262	2·913	2·823	11·0	9·30
200	0·31	0·350	3·330	3·240	9·6	10·80

* (*i.e.*, as measured.)

Figure 1 gives the relations between excess air and CO_2 and O_2 percentages in graphic form.

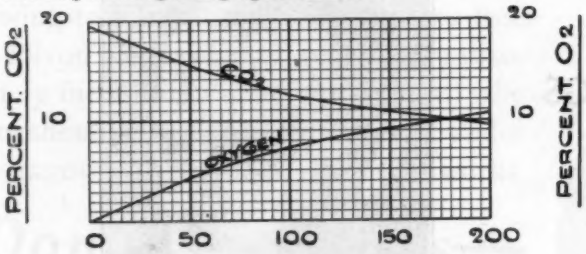


FIGURE 1.—*Relations between Excess Air, CO_2 and Oxygen for Producer Gas Products—Coke as Primary Fuel.*

The most convenient way of assessing steam recovery is on the basis of steam per pound of producer fuel. Hence, still basing on the same relevant data as before, we get the following deductions:—

$$\text{Producer gas per pound of producer coke} = \frac{12{,}000 \times 0{\cdot}86}{115} = 90 \text{ cu.ft.}$$

If S_1 = Sensible heat in the products of combustion resulting from burning 1 cu.ft. of producer gas, measured as B.Th.U. from 0° C. (32° F.) at boiler inlet temperature and excess air content figures.

S_2 = Ditto at boiler outlet.

Assume boiler radiation loss = 5 per cent., *i.e.*, 0·05, then steam per pound of producer coke

$$= \frac{90\,(S_1 - S_2)}{966} \times 0{\cdot}95 = 0{\cdot}0885\,(S_1 - S_2) \text{ lb. of steam from and at } 212° \text{ F.}$$

In order to calculate the sensible heats on the different combinations of constituent gases, Table 3 has been prepared from Tables 1 and 2, giving the actual constituents of products per cubic foot of producer gas burnt with varying excess air contents.

TABLE 3.—*Constituents of Products of Combustion of 1 Cu.Ft. of Producer Gas, burnt with Varying Excess Air Contents.*

Excess Air. Per Cent.	Nitrogen.	Oxygen.	Water Vapour.	CO_2.	Total.
1	2	3	4	5	6
0	1·26	*Nil*	0·09	0·31	1·66
50	1·59	0·09	0·09	0·31	2·08
100	1·92	0·18	0·09	0·31	2·50
150	2·25	0·26	0·09	0·31	2·91
200	2·58	0·35	0·09	0·31	3·33

For the calculation of sensible heats, the author for many years used the figures given by Mallard and Le Chatellier, but more recent researches have shown that for certain constituents they are rather on the high side in the higher temperature ranges. He is now, therefore, using figures given by Partington and Shilling, and these appear to be acceptable in all quarters.

In order to arrive at a series of curves for steam outputs for varying combinations of waste gas temperature and excess air, it is necessary to estimate or assume the boiler outlet gas temperature. For the type of unit which will be discussed later in the paper, a safe figure for boiler outlet gases when generating steam at 160 lb. pressure is 240° C., *i.e.*, 464° F., which is only some 50° C. above the temperature of the saturated steam, and for the preparation of Figure 2 all the "S_2" figures in the formula have been calculated at the temperature of 240° C.

The results plotted in Figure 2 show steam yield in pounds from and at 212° F. per lb. of producer fuel under various combinations of boiler inlet temperature and excess air content, and, of course, assuming the relevant data given earlier in this study.

The author would like to state at this stage that these steam recovery figures are definitely on the safe and conservative side, as

(*a*) the boiler outlet figure is in most cases of actual practice below 240° C., and

(*b*) no account has been taken of additional moisture in the flue gases carried over as vapour from undecomposed producer steam.

Taking the modern horizontal setting as typical of regenerative working, we get—on large installations—a fuel consumption of approximately 13 lb. of producer coke per 100 lb. of coal carbonized. This coke is normally hot when fed to the producers, but it is extremely difficult to arrive at a correct mathematical figure for the actual sensible heat content averaged over the period of a complete retort cycle.

Waste gases leaving the regenerators from settings of this type, and assuming reasonable care is taken against excessive cooling either by radiation or by infiltrating air, would be to the order of 480° C. coupled with about 200 per cent. excess air, this increase in volume being entirely due to infiltration after the gases leave the combustion zone, *i.e.*, as they pass through the regenerator and flue system under negative pressure.

This combination gives us a potential steam yield of 2·8 lb. of steam per lb. of producer fuel, *i.e.*, a yield of 36·5 lb. of steam from and at 212° F. per 100 lb. of coal carbonized.

Coming now to vertical retorts, modern practice is completely to eliminate regenerators, *i.e.*, the waste heat boiler takes full control of the combustion chamber gases, and air preheating is arranged from other sources, such as cooling the retort bases, circulating through hollow walls of the settings, &c., and so picking up heat which would otherwise be rejected with the discharged coke, or lost by radiation from the surfaces of the settings. The result is that with verticals, and a well-disposed system of fluework, a boiler inlet temperature of, say, 850° C., coupled with 100 per cent. excess air is quite common practice, giving a yield of 5·3 lb. of steam from and at 212° F. per lb. of producer fuel. Taking 15 lb. of coke per 100 lb. of coal carbonized, we get a steam yield of 79·5 lb. of steam per 100 lb. of coal carbonized. In other words, by eliminating regeneration on the flue-gas circuit, preheating the secondary air of combustion by absorbing heat from other sources of potential loss and allowing the waste gases to go direct to the waste heat boiler, the steam yield per unit of coal carbonized is more than doubled; or, looked at from another point of view, the increase of 2 lb. of producer coke per 100 lb. of coal carbonized has given us an increase of 43 lb. of steam. It must be appreciated, however, that another factor has crept in on this discussion, and that is, the sensible heat in the hot coke. With verticals, owing to the water gas reaction, coupled with cooling the bottom of the retorts by incoming secondary air, a considerable percentage of the total heat in the coke has already been recovered, and not lost by rejection to atmosphere.

In the case of horizontals, the hot coke is discharged at high temperature, and the question of steam recovery from this hot coke forms the subject matter of the next section of this paper, and, to have a fair comparison on a heat-balance basis between vertical and horizontal practice, the potential steam yield by dry coke quenching must be taken into account.

DRY COKE QUENCHING.

Whereas on verticals the sensible heat in the coke is largely extracted during the inherent retorting process and so credited as useful work, in the case of horizontals as much as 25 per cent. of the total heat in the producer fuel is rejected with the coke. Present-day practice is still to water-quench this coke, with resultant complete loss of the

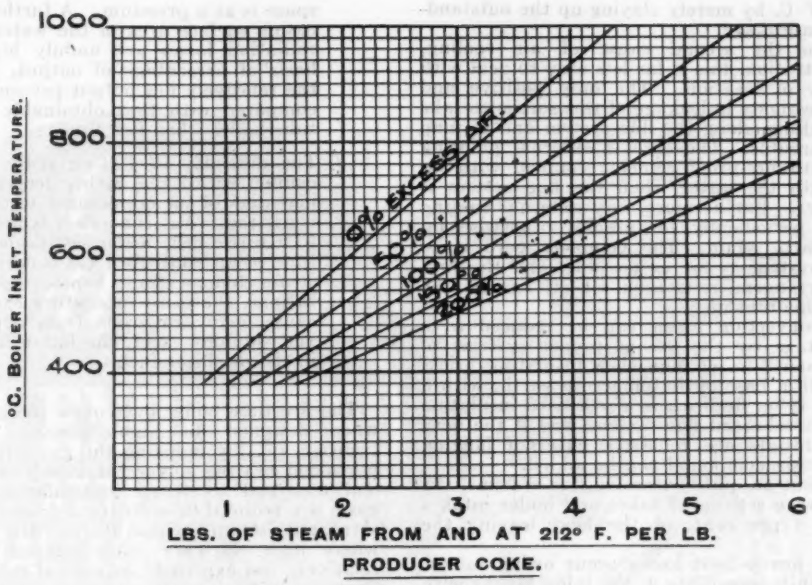


FIGURE 2.—*Curves for Steam Yield.*

sensible heat content of the coke-mass, and incidentally, to the accompaniment of clouds of useless steam and atmospheric pollution.

Coke cooling by the circulation of inert gases with resultant heat recovery is already established as sound mechanical practice, but its adoption (except for large coke oven installations) has been slow, owing to capital costs. Possibly, the enhanced value of dry-quenched water-free coke, coupled with cheaper facilities for obtaining money for extensions may improve the outlook for dry coke quenching plants in the future.

The essential feature of dry-quenching plant is suitably disposed chambers for the reception of the hot coke, these chambers and their attendant cooling circuits being fitted with air-tight charging and discharging doors, &c., to avoid oxidation of the coke. Each cooling circuit operates in series with an induced draft waste heat boiler. Any oxygen present in the circuit when the latter is closed is rapidly burnt off, leaving an inert circulating mixture of nitrogen and a little CO_2; the sensible heat from the coke in the chamber is absorbed by the gases as they pass through the boiler. The cooled-off inert gases then return to the cooling chamber and so repeat the round of the closed circuit.

Looked at from the quantitative viewpoint, the mean temperature of coke as discharged from horizontals is to the order of 950° C. and the mean specific heat of average coke between the limits of atmospheric temperature and 950° C. appears to vary from 0·35 to 0·4, according to the various continental authorities who have developed dry coke quenching systems.

Averaging out the specific heat as 0·375 and assuming the coke is cooled 700° C., *i.e.*, a drop of 1,260° F. and allowing 7½ per cent. for radiation and other losses from the cooling plant, we get

$$\text{Steam per pound of coke cooled} = \frac{1{,}260 \times 0{\cdot}375 \times 0{\cdot}925}{966}$$

$$= 0{\cdot}45 \text{ lb. from and at } 212° \text{ F.,}$$

or, per ton of coke quenched, slightly over

1,000 lb. from and at 212° F.

Assuming 13 cwt. of coke per ton of coal carbonized, a steam yield of 650 lb. of steam from and at 212° F. is obtained per ton of coal carbonized.

Straight "vertical" practice can now be compared with horizontal-cum-coke-quenching practice, from the point of view of steam recovery figures, and the following figures are average:—

1. *Verticals* (per ton throughput)—
   Producer fuel at 15 per cent. . = 336 lb.
   Steam at 5·3 lb. per lb. . . . = 1,780 lb. from and at 212° F.
2. *Horizontals* (per ton throughput)—
   Producer fuel at 13 per cent. . = 270 lb.
   Steam at 2·8 lb. per lb. . . . = 755 lb.
   Steam from dry coke quenching = 650 lb.
   1,405 lb. from and at 212° F.

Actually in practice, it must be remembered that the lower producer coke figure for horizontals is due in a certain measure to *hot coke* charging, *i.e.*, if *all* the coke is dry-quenched ("sale" coke + producer coke) the 13 per cent. figure is likely to be a little higher owing to cold charging of the producers. Furthermore, it must not be forgotten that in the case of horizontals, coupled with dry coke quenching, the capital cost of the dual recovery plant must of necessity be in excess of that of a waste heat boiler installation on straight verticals.

IMPROVING THE EFFECTIVENESS OF WASTE HEAT RECOVERY.

Heat losses in the flue gas circuit after leaving the combustion chambers—and, where used, the regenerators—are due to two main causes:—

(*a*) infiltration of cold air,
(*b*) radiation, convection, &c., losses.

Regarding (*a*), it will be seen from the detailed calculations already given that whereas incoming air does not lower the *total* heat in the waste gases, it increases the volume thereof, reduces the temperature by dilution, and increases the *percentage* reject at any particular fixed boiler outlet temperature. Air infiltration is therefore a two-fold evil. It not only militates against extraction efficiency, but also increases the flow rating of the waste heat boiler and fan unit by forcing the latter to handle an enhanced volume of lower-grade gases.

The causes of air infiltration are two-fold:—

(1) local entry in comparatively large quantities, due to badly fitting inspection doors, sight holes, and (particularly) dampers.
(2) general differential diffusion due to porous brickwork in the fluework and (where present) the regenerative system.

The first cause is readily dealt with by properly fitting the doors, plugs, &c., and by using well-designed, air-excluding damper frames and hoods.

Apart from preventing air travelling along the damper slots, &c., it is also important for the dampers themselves to be a close fit to avoid settings which are "off" admitting cold air into the main flue. Inclined and horizontal dampers are normally the best design from the point of view of sealing, as they automatically lie on their seats when closed.

It is of interest to record that one of the greatest difficulties in advancing the case for waste heat recovery in the Gas Industry was convincing engineers that stack temperatures were no criterion of carbonizing efficiency. The "black flue" used to be looked upon as synonymous with efficient working, few ever bothering to find out the real cause of the low temperature; in the course of a single morning's investigation on a large horizontal retort installation the author has increased the stack temperature

from 250° C. to 450° C. by merely claying-up the outstanding sources of air in-leakage.

Turning now to the second cause of air cooling, differential air infiltration, this is far less easy to deal with owing to difficulty of location. The only positive and definite way to investigate in-leakage of this sort is to take a series of CO_2 readings along the flue system and so map out the zones of trouble. The cure is external painting and/or coating with fire-proof cement, coupled with internal spraying with the latter when the flue system is available for repairs. Furthermore, any external coating must be watched periodically for cracks, otherwise insidious leakage starts again. The complete cure is to steelcase the flue system as far as possible, and the first cost of such an arrangement is soon set off against the elimination of flue maintenance.

Radiation and convection losses can be reduced to a very small percentage by the use of proper systems of lining. Not less than 3 in. of high class insulating brick, such as a brick with a base of diatomaceous earth, with a protecting layer of 4½-in. firebrick is a well-tried insulating combination for a steel-cased flue system, and if the very best quantitative results are required, external lagging with suitable magnesia compound can be added.

On tests carried out on quite extensive flue systems, the total heat loss between setting off-takes and boiler intakes has not exceeded 3 per cent. of the heat leaving the offtakes.

In certain cases, heavy heat losses occur owing to wet ground—a very definite possibility in low-lying Works with underground flues. In certain cases the author has encountered, natural sub-surface drainage streams have needed diversion to prevent flue gas cooling, especially in "made" ground.

Water in contact with flues is a rapid transmitter of heat, and also a heavy absorbent thereof; furthermore, if the water actually gets inside the flue system, it not only reduces temperature, but also causes rapid corrosion in the steel ductwork beyond the waste heat boiler system, owing to the greatly increased saturation of the gases.

WASTE HEAT BOILERS GENERALLY.

The fundamental fact to be considered in the choice of boiler type for waste heat recovery hinges on the nature of the heat transfer problem involved. The bulk of heat transfer at high temperatures is by radiation, enunciated by Stefan, and later by Boltzman, as varying as the fourth power of the absolute temperature. Experimental work carried out by the author's firm has shown that with a boiler furnace temperature of 1,250° C. and a stack temperature of 250° C., approximately 70 per cent. of the heat transfer is by radiation and 30 per cent. by contact effect. On these figures, with a temperature at the waste heat boiler inlet of 1,000° C., the percentage of total heat transfer by pure radiation will be

$$70 \times \frac{(1{,}000 + 273)^4}{(1{,}250 + 273)^4} = 70 \times \left(\frac{1{,}273}{1{,}523}\right)^4 = 34{\cdot}3 \text{ per cent.}$$

At a boiler inlet temperature of 700° C., the percentage transfer by radiation =

$$70 \times \frac{(700 + 273)^4}{(1{,}250 + 273)^4} = 70 \times \left(\frac{973}{1{,}523}\right)^4 = 16{\cdot}6 \text{ per cent.}$$

From the above general comparisons, it will be realized that an effective waste heat boiler, fundamentally handling low grade gases compared with those appertaining to solid fuel firing practice, must be designed on lines to give the best results from contact heating. The expression "contact heating" as used herein means intimate molecular contact between the hot gas particles and the boiler heating surface, *i.e.*, on the lines developed on the late Professor Nicolson's classical work, following Professor Osborne Reynolds' earlier researches, on this particular subject.

The question as to whether the water tube or fire tube boiler was the design which best met gas works requirements has entailed a good deal of thought and discussion, but it can now be accepted that the fire tube boiler is practically standardized as the waste heat boiler for gas works practice.

The objections to the water tube boiler as applied to waste heat recovery on retort settings are as follows:—

(*a*) Handling gases under negative pressure, the casing requires constant attention to keep it air-tight.

(*b*) To obtain close contact between gases and tube heating surface, the tubes must be closely set, which makes cleaning difficult, and results in added resistance in the circuit and aggravates (*a*).

(*c*) The water tube design is too bulky for confined spaces particularly where headroom or operating space is at a premium. A further result of the large casing surface area of the water tube boiler is that radiation losses are unduly high, compared on a basis of percentage of output, and having in view the relatively low output per unit of heating surface compared with that obtainable on a similar water tube boiler when fuel fired.

(*d*) The difficulty in getting really effective molecular contact with a reasonably deep gas-path involves the necessity of an economizer where efficient recovery is desired. An economizer is not a desirable adjunct to a waste heat boiler, as its outgoing gas temperature is not controlled (as occurs with the boiler) by steam temperature; hence, especially at low load ratings, the gas temperature can fall low enough to cause heavy corrosion from deposition of moisture and sulphuric acid, the latter from original sulphur in the producer fuel.

The fire tube boiler overcomes the above difficulties and when designed for high-efficiency "contact" heating transfer, *i.e.*, by inducing the gases through suitably proportioned heating surface at velocities which cause turbulent flow and accelerate molecular impact, the outgoing gases are reduced in ordinary service to some 50° C. above saturated steam temperature. On small installations where high efficiency with induced draft is considered relatively too expensive in capital outlay, a natural-draft fire tube boiler rejecting its gases at sufficient temperature to maintain the requisite pull to overcome setting *plus* boiler resistance is a simple arrangement. It must be appreciated, however, that natural draft boilers render the settings very sensitive to drafting conditions, and their adoption needs much care and thought of flue lay-outs and other details, otherwise the settings suffer. On the other hand, induced draft, apart from the more effective heat transfer and therefore more efficient extraction and higher boiler ratings, gives complete positive control on the settings under all conditions of service.

Referring to the type of high gas velocity fire tube waste heat boiler with which the author has been associated for many years, apart from pure heat transfer efficiency, the following points of detail have been studied and incorporated in standard designs, in order to meet the requirements of a reliable, easily-maintained steaming unit, suitable for the practically continuous service which a waste heat boiler associated with retorting plant calls for.

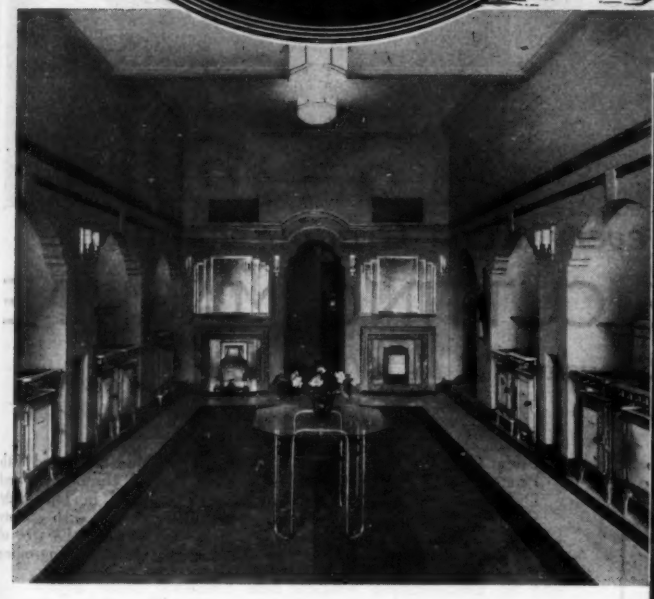
(*a*) *Tube Cleaning.*

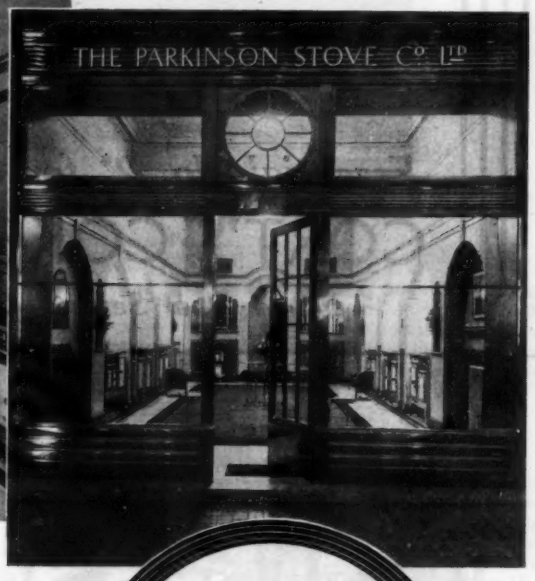
Tube cleaning is really a dual problem, affecting both the hot gas and the water sides of the tube surface. Dealing with the hot gas side, a suitable disposition of plugs on the cover of the boiler outlet box enables rodding and brushing to be carried out without interfering with the running of the boiler. This service is required about once a week with the normal waste gases from retort installations. A further simple method of routine tube cleaning is by the insertion of coarse wood chippings at the intake chamber through a suitably designed hopper; these shavings are carried through the tubes by the speed of the gases and scrape the surface en route, finally passing through and cleaning the fan blades. This method of cleaning does not apply to low velocity natural draft units, for obvious reasons.

The necessity for cleaning on the water side should be avoided as far as possible, by suitable feed treatment; in a gas works very little condense is normally available by way of feed, *i.e.*, the bulk of the feed is raw water, but treatment on modern lines to a degree of hardness commensurate with successful operation at the pressures and ratings worked to in normal practice is neither expensive nor difficult. In addition to avoiding periodic shut-downs for internal cleaning (with the expense attached thereto) the other advantages of good feed are the avoidance of a gradually falling efficiency as the heating surface gets insulated by scale and—even more important—the avoidance of leakages due particularly to the overheating of tube ends by scale on the inlet end tube plate and front sections of the tubes.

To give internal accessibility, the design of boiler with which the author is associated is arranged with the tubes grouped in nests, to allow ingress for cleaning and working. Continental designs are in use where a completely withdrawable tube assembly is effected by bolted end plates, but these suffer from two defects —time taken to break and remake the joints between tube plates and the rest of the boiler shell, and the fact that even when the tube nest is withdrawn, it is

An Invitation to GAS ENGINEERS WHILE ATTENDING THE ANNUAL CONFERENCE of the INSTITUTION





To all Gas Engineers and Administrators attending the Annual Meeting of the Institution of Gas Engineers, we extend a cordial invitation to visit our Showrooms situated in Terminal House, Grosvenor Gardens, near Victoria Station. The extensive range of the latest Parkinson Gas Appliances on view will appeal to all who are intimately concerned with modern developments designed to give greater service to consumers, and by so doing, enhance the prestige of the Gas Industry.

Visit the PARKINSON SHOWROOMS

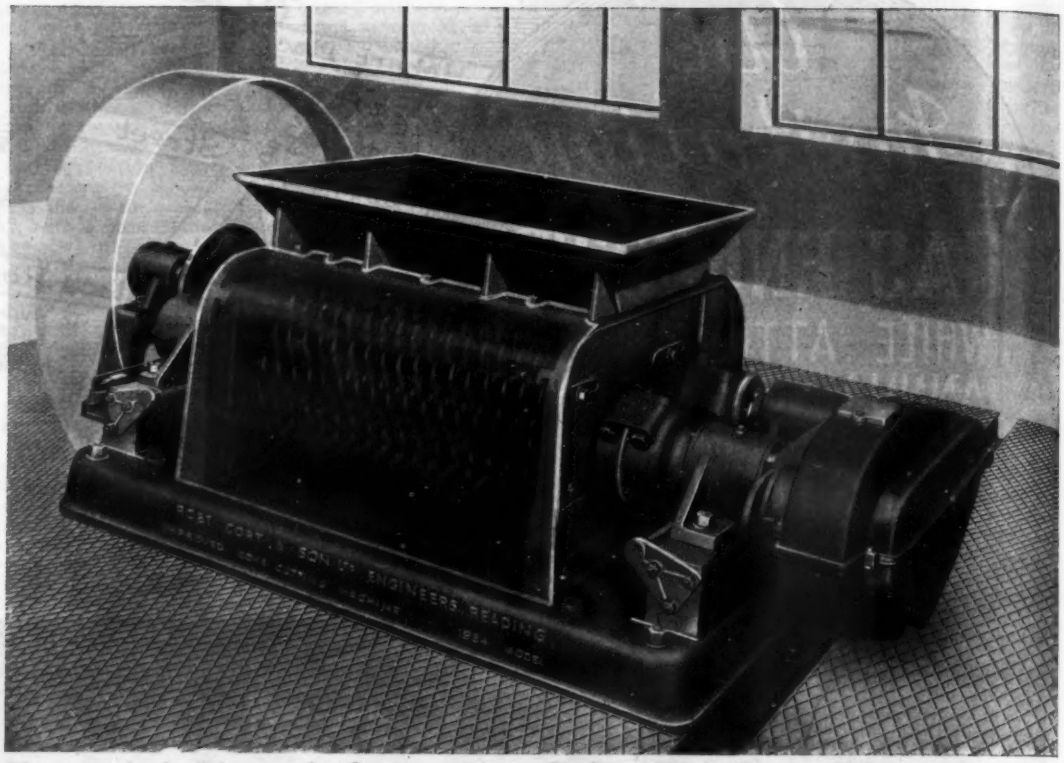
THE SOCIETY OF BRITISH GAS INDUSTRIES 1905

THE PARKINSON STOVE CO. LTD. Stechford, BIRMINGHAM

London Showrooms: TERMINAL HOUSE · GROSVENOR GARDENS SW1 and at MANCHESTER, GLASGOW, BELFAST, DUBLIN & WELLINGTON N.Z.

MEMBER OF THE SOCIETY OF BRITISH GAS INDUSTRIES

MODERN COKE GRADING



Essential No. 2 for every Coke Grading Plant.*

CORT'S COKE CUTTING MACHINE

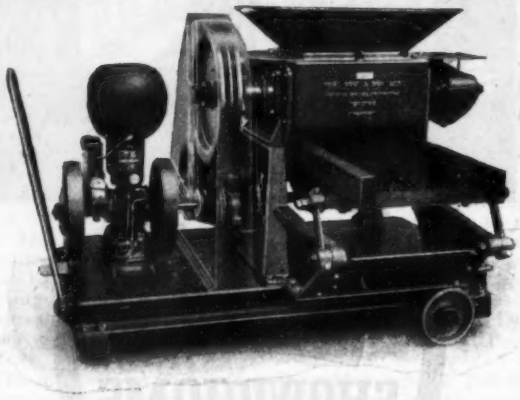
1934 New Series. Capacities, 5 to 100 tons per hour.

ABRIDGED SPECIFICATION:

Patent Coke Cutting (or Sizing) Machine, 1934 Model. Fitted with Patent Manganese Steel Cutters; Heavy Pattern Ring-oiling and Dustproof Bearings; Machine-cut Gearing enclosed in Dust-tight Oil-bath Case; Standard Flywheel-fast Belt Pulley with Safety Shearing Pin Coupling; Adjusting Device for varying the size of cut coke and taking up wear on the cutters; Outside Ring-oiling Plummer Block and Pedestal; etc., etc.

The outstanding proved features include:

1. **High efficiency sizing (variable at will).**
2. **Minimum of waste produced by cutting.**
3. **Low maintenance cost.**
4. **All wearing parts especially accessible.**
5. **Robust construction—built like a machine tool.**



For the Smaller Undertaking.

Self-contained Portable Coke Cutting and Screening Outfit, with Engine or Motor Drive. Capacities 2 to 10 tons per hour.

This new series Coke Cutting Machine has been supplied to, or is on order for, the undermentioned Gas Works:—

Fulham.	**Farnham.**
Nine Elms.	**Guildford.**
Sydenham.	**East Grinstead.**
Berkhampstead.	**Etc., etc.**

ROBT. CORT & SON, Ltd. READING

** For Essential No. 1, see page 511.*

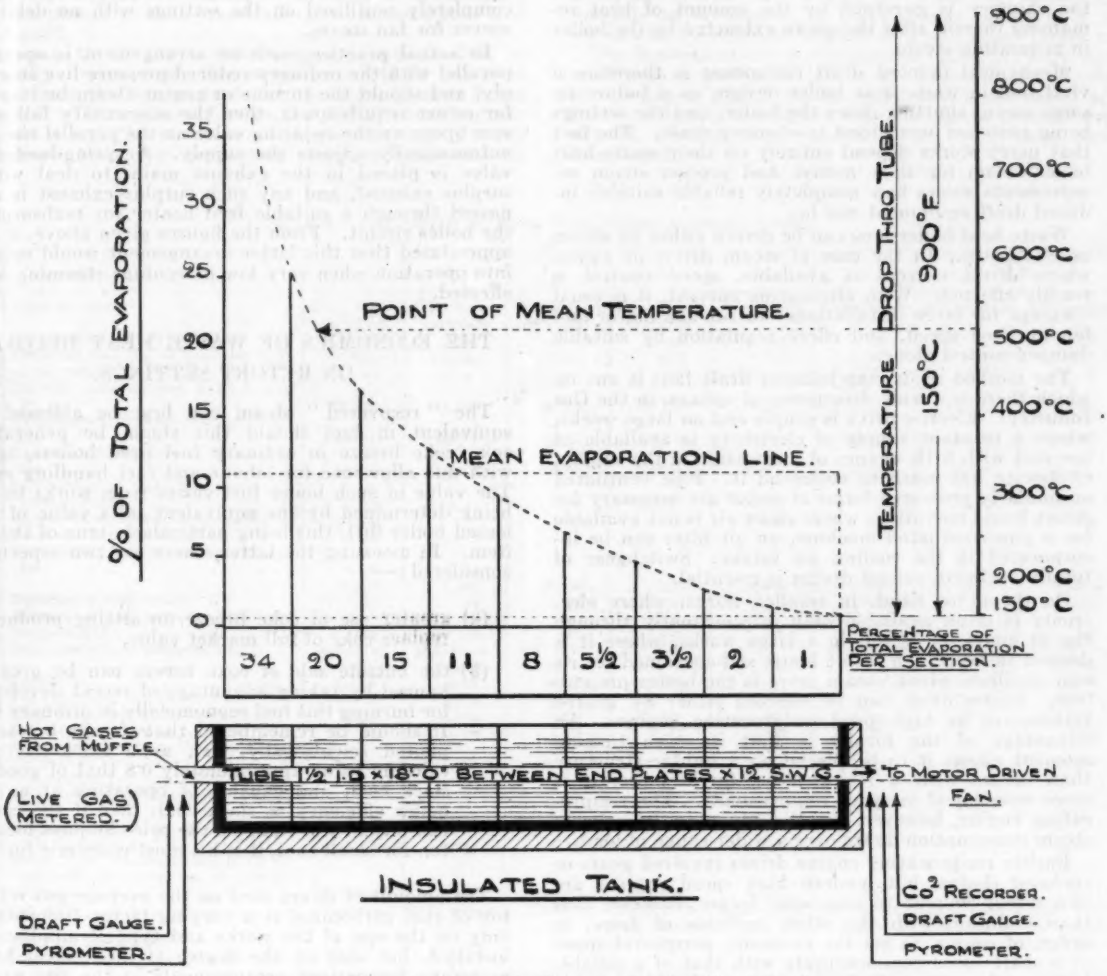


FIG. 3.—*Experiments with Tube in Sectionalized Tank.*

practically inaccessible except for the outside tubes without complete dissembly.

(*b*) *Avoidance of boiler leakages.*

A waste heat boiler of the type under review must be designed so that at maximum rating there is a positive supply of " solid " water to at once replace steam bubbles leaving the heating surface. The zone of maximum liberation is near the inlet tube plate, where, unless water flows at once to take the place of released steam, an insulating wall of froth is set up, which delays heat transfer and causes overheating of the tube ends. The factors influencing correct design on this score are positive circulation, coupled with inlet feed arrangement, and tube setting and spacing.

It will be appreciated that scale promptly discounts all the good resulting from correct design, hence the importance of good water conditions.

Circulation in itself is a function of displacement currents in the boiler, *i.e.*, correct circulation does not take place until the boiler is heated up, which means that unless the boiler is brought up from cold to full pressure gradually—with periodic opening of the blowdown to avoid cold layers at the bottom—unequal expansion will take place and cause weeping of the seams, and even tube end leakage. The use of a simple circulator, with external steam connection for starting up purposes, positively prevents heating up from becoming a somewhat delicate operation. Once the boiler is steaming and on the main, the designed circulatory system is, of course, in full natural operation.

(*c*) *Superheaters.*

Superheaters are of necessity located in the boiler intake chambers; for waste gases up to 700° C. they are set in the flow of the gases, but above this figure they must be suitably protected from the gas stream flow and arranged for radiant heat absorption, for the protection of the tube material. It is essential in these latter cases that the steam flow speed should be sufficient to prevent undue metal surface temperature and with a correctly designed assembly arranged for radiant heating, this arrangement is entirely effective in an intake chamber temperature as high as 1,100° C.

(*d*) *Dry steam.*

The characteristics of the steam release on a single pass fire tube boiler are shown in Fig. 3, which represents the transfer of heat to water on a single tube fitted in a sectionalized tank. It will be noted that the first sections do the bulk of the work, hence there is a very much more rapid evaporation rate over the first few feet of the tube compared with the average steam release over the total water surface. Even with a correctly-designed dry-pipe and steam offtake, it will be appreciated that at high ratings, there will be such violent local ebullition at the gas intake end of the boiler that the steam space section of the boiler drum at that end must contain a considerable amount of moisture which has come up as the " envelopes " of individual bubbles. It will be seen, therefore, that too small a boiler drum for any given rating increases the potentialities of wet steam leaving the boiler, thus calling on the superheater to act as an evaporator as well as a superheater—a state of affairs which is unsound practice.

(*e*) *Induced Draft Equipment.*

Whereas on certain types of small installation, natural draft boilers operating at low gas flow rates are supplied, the standard arrangement for all other waste heat boiler plants is the high velocity boiler, which must of necessity involve induced draft equipment. In the first place, the boiler resistance due to the speeding up of the gases to accelerate heat transfer by molecular contact is in excess of what can be handled by natural draft; furthermore, the natural

draft available from the gases eventually rejected to the chimney is governed by the amount of heat remaining therein after the quota extracted by the boiler in generating steam.

Mechanical induced draft equipment is therefore a vital link in waste heat boiler design, as a failure on same means shutting down the boiler, and the settings being switched over direct to chimney draft. The fact that many works depend entirely on their waste heat boiler steam for their motive and process steam requirements shows how completely reliable suitable induced draft equipment can be.

Waste heat boiler fans can be driven either by steam or electricity. In the case of steam drive, or again, where direct current is available, speed control is readily effected. With alternating current, it is usual —except for large installations—to run the motor and fan at fixed speed, and effect regulation by suitable damper control alone.

The method of driving induced draft fans is one on which there is a wide divergence of opinion in the Gas Industry. Electric drive is simple and on large works, where a constant supply of electricity is available at low cost with little chance of a cessation in the supply, electricity has much to commend it. Pipe ventilated or similarly protected forms of motor are necessary for retort house operation; where clean air is not available for a pipe ventilated machine, an air filter can be incorporated in the cooling air intake. Switchgear of totally enclosed, robust design is essential.

On the other hand, in smaller works, where electricity is often available only intermittently through the 24 hours, or again, in a large works, where it is desired to keep each retort house self-contained for its own auxiliary plant, steam drive is the better proposition. Steam drive can be effected either by geared turbines or by high-speed reciprocating engines. An advantage of the former is that its even turning moment allows it to be placed on a lighter structure than occurs with a reciprocator; furthermore, it is more economical in space requirements. The reciprocating engine, however, has the advantage of a lower steam consumption figure over a wider range of load.

Earlier reciprocating engine drives involved gears or enclosed chains, but modern high speed engines are now direct coupled to somewhat larger diameter fans than maintain with the other methods of drive, in order, of course, to get the necessary peripheral speed at a shaft speed commensurate with that of a reliable high-speed engine. For larger sizes of reciprocating engine drive, compound engines are preferable, both to economize in steam, and to get a more even turning moment.

The Utilization of Exhaust Steam from Induced Draft Fans.

It will be appreciated that unless some proper use can be made of the fan steam exhaust, this item would represent a direct debit to the over-all performance of the plant. In practice, therefore, two systems are adopted.

The first is to regenerate the heat in the exhaust steam by means of a surface type feed heater, taking care in the over-all original design that at the normal working range of the boiler the fan consumption is such that practically complete regeneration is possible. This can be effected when the total steam taken by the fan does not exceed about 13 per cent. of the boiler's output, and assumes that cold feed is used at the heater intake. If warm feed from the gas condensers or other source is used, the recovery percentage is, of course, reduced.

The second method of using the exhaust applies to vertical retorts and chambers where low pressure steam is required for steaming the coke and effecting the water gas reaction. In these cases, steam is exhausted from the fan drive at (say) 20 lb. back pressure, and led to the distribution pipes at the retort bases; in certain cases this exhaust steam is re-superheated by an auxiliary superheater in the waste gas flue before it enters the retorts.

Naturally, exhausting at considerable back pressure means a much higher turbine or engine steam consumption per unit of power, but this is quite permissible in practice, as the following figures will show.

Basing on verticals steaming at 20 per cent. and steam recovered per pound of producer fuel being 5·3 lb. from and at 212° F., the equivalent recovery steam per ton of throughput, assuming fuel 15 per cent. by weight, equals 1,780 lb. from and at 212° F. Steam required by retorts at 20 per cent. equals 448 lb. actual, say 550 lb. from and at 212° F.

This latter figure is 31 per cent. of the boiler's total output. In other words, this proportion of the boiler's output can be used by the back pressure engine or turbine, and completely reutilized on the settings with no debit whatsoever for fan steam.

In actual practice, such an arrangement is operated in parallel with the ordinary reduced-pressure live steam supply, and should the turbine or engine steam be insufficient for retort requirements, then the momentary fall in pressure opens up the reducing valve on the parallel circuit and automatically adjusts the supply. A spring-loaded relief valve is placed in the exhaust main, to deal with any surplus exhaust, and any such surplus exhaust is usually passed through a suitable feed heater for reabsorption in the boiler circuit. From the figures given above, it will be appreciated that this latter arrangement would only come into operation when very low percentage steaming is being effected.

THE ECONOMICS OF WASTE HEAT RECOVERY ON RETORT SETTINGS.

The "recovered" steam can best be assessed as its equivalent in fuel should this steam be generated by coke/coke breeze in ordinary fuel fired boilers, together with due allowance for labour and fuel handling services. The value of such boiler fuel varies from works to works, being determined by the equivalent sales value of the released boiler fuel, this being particularly true of the breeze item. In assessing the latter, there are two aspects to be considered:—

(*a*) greater use of coke breeze on setting producers, to replace coke of full market value,

(*b*) the outside sale of coke breeze can be greatly enhanced by taking advantage of recent developments for burning this fuel economically in ordinary boilers. It should be remembered that if coke breeze is exploited scientifically, *i.e.*, as a smokeless fuel of calorific value approximately 0·8 that of good boiler slack coal, and capable of operating at as high a boiler efficiency as slack coal, then if the consumer can buy at *less* than 0·8 the price he pays locally per ton for small coal, it is his most economic fuel.

The amount of steam used on the average gas works per ton of coal carbonized is a varying factor—depending not only on the size of the works and type of auxiliary plant installed, but also on the degree of mechanical handling necessary for various arrangements in the site available, and the amount of ancillary by-product plant in operation in the works. Figures varying from 800 to 2,000 lb. per ton of coal carbonized have been given by various authorities.

Assuming, however, that water gas plants are rendered self-contained by their own waste heat boilers, it is quite normal practice for the waste heat boilers on the retorting plant to deal with the rest of the works' steam and power requirements. In certain cases load fluctuations call for subsidiary steam—either from fuel fired boilers or "make-up" producer gas on the waste heat boiler plant—especially during periods of low carbonizing load, when the works' steam requirements do not fall *pro rata* with the retort house throughput. In certain cases, auxiliary firing can be dispensed with by a steam accumulator system, *i.e.*, to absorb overplus of steam when available at certain times of the day, to meet peak requirements. It is not proposed to enlarge on these methods of balancing the steam yield in this paper, as it is a branch of mechanical engineering as applied to gas works' practice which is of sufficient scope to merit a paper on its own, and is outside the subject matter covered by the title of this paper.

TYPICAL TEST FIGURES.

Table 4, giving test figures of waste heat boilers on retort settings, has been taken by the author from typical logs of representative plants supplied by his Company. In order to obtain accurate readings, all CO_2 figures from continuous recording apparatus were periodically checked by Orsat readings. Furthermore, particular care has been taken to locate properly all thermocouples for boiler inlet temperature readings, in order to avoid false records, due to radiation from the couples to cooler bodies—a most important factor in waste heat boiler testing, and one which, if neglected, gives rise to serious errors. Coke calorific values were determined by calorimeter tests checked by analysis and subsequent calculation.

All the plants given in the test sheet were fitted with automatic feed regulators, but in order to ensure steady feeding, and so even absorption of the fan exhaust on those

installations fitted with steam driven fans, care was taken to set the pumps so that practically steady continuous feed was assured.

Referring to the item concerning steam-equivalent of electrically driven fans, the steam per E.H.P. has been assessed from the figures given for the works' power house concerned. These steam figures per E.H.P. may appear high, but it must be remembered that in the case of a gas works plant, the power generating units are comparatively small and operate over a wide power loading, hence cannot compare as favourably as (say) similar plants in a steel-works where electricity is generated on a much larger scale.

The theoretical check calculations (Item 29) were worked out for each particular job on the general lines developed in this paper, and it will be noted that in all cases, actual recovery figures are higher than calculated figures—especially on verticals and chambers—for the reasons already mentioned.

TABLE 4.—*Test Figures of Waste Heat Boilers on Retort Settings.*

1	Gas-Works	"A."	"B."	"C."	"D."	"E."	"F."	"G."	"H."
2	Type of retorts	Continuous verticals	Continuous verticals	Continuous verticals	Continuous verticals	Chambers	Horizontals	Horizontals	Horizontals
3	Coal carbonized per day, tons	130	155	140	24	135	184	93	48
4	Producer fuel, lbs. of coke per hour	1,820	2,240	1,950	403	1,860	2,020	1,300	715
5	(4) as percentage of (3)	15	15·4	15	18	14·8	11·8	15	16
6	Calorific value of fuel, B.Th.U. per lb. net	12,150	12,100	12,300	12,100	12,000	12,000	11,900	12,000
7	Temperature of gases at boiler inlet, T_1	760° C.	890° C.	730° C.	780° C.	800° C.	490° C.	560° C.	480° C.
8	Temperature of gases at boiler outlet, T_2	220° C.	230° C.	220° C.	230° C.	220° C.	215° C.	220° C.	200° C.
9	CO_2 content of waste gases at boiler inlet, per cent.	13	15·4	12	12·5	15·5	10·9	11	10·5
10	Excess air equivalent of (9), per cent.	90	50	115	100	50	150	143	165
11	Number of boilers under test	2	1	1	1	1	1	1	1
12	Total boiler heating surface, square feet	2 × 1,220 = 2,440	3,400	3,200	600	2,000	4,250	2,000	1,220
13	Duration of test, hours	24	24	48	12	12	168	96	24
14	Average steam pressure, lbs. per square inch	119	118	110	115	118	115	98	95
15	Saturated steam temperature, T_s	350° F. = 177° C.	349° F. = 176° C.	344° F. = 173° C.	347° F. = 175° C.	349° F. = 176° C.	347° F. = 175° C.	337° F. = 170° C.	335° F. = 168° C.
16	Superheat	120° F.	150° F.	95° F.	*Nil*	*Nil*	210° F.	200° F.	125° F.
17	Feed temperature, boiler inlet	180° F.	90° F.	175° F.	90° F.	60° F.	150° F.	170° F.	165° F.
18	Evaporation per hour, lbs. actual	8,040	9,650	8,900	1,790	7,000	4,845	3,750	1,845
19	Evaporation factor	1·15	1·25	1·13	1·17	1·20	1·23	1·20	1·165
20	Evaporation per hour, lbs. "from and at 212° F."	9,250	12,050	10,050	2,100	8,400	5,960	4,500	2,150
21	Evaporation per square foot of heating surface per hour, lbs. "from and at 212° F."	3·79	3·55	3·15	3·5	4·2	1·4	2·25	1·76
22	Evaporation per lb. of fuel, lbs. "from and at 212° F."	5·08	5·39	5·15	5·2	4·51	2·95	3·46	3·0
23	Mean heat transmission—B.Th.U. per hour per square foot of heating surface	3,650	3,430	3,040	3,380	4,055	1,350	2,175	1,700
24	Fan drive	Turbine	D.C. motor	Turbine	Back pressure turbine	D.C. motor	Compound engine	Single cylinder engine	Single cylinder engine
25	Total fan horsepower	17½	16	15	2	19	14	9	5½
26	Steam equivalent of (25), lbs. per hour actual	Regenerated	400	Regenerated	Exhausting to settings	455	Regenerated	Regenerated	Regenerated
27	(26) as percentage of (18)	..	4·15	..	..	6·5	..	..	..
28	Extraction efficiency, *i.e.*, $\frac{T_1 - T_2}{T_1 - T_s} \times 100$, per cent.	92·5	92·5	91·7	91	93	87·5	87·2	90
29	Calculated evaporation from available data, lbs. "from and at 212° F." per lb. of producer fuel	4·8	5·1	5·0	5·0	4·3	2·85	3·37	2·9
30	Percentage difference between (22) and (29)	+ 5·5	+ 5·4	+ 2·9	+ 3·85	+ 4·65	+ 3·4	+ 2·6	+ 3·3
31	Method of measuring boiler evaporation	Meter	Meter	Meter	Tank	Tank	Meter	Meter	Meter
32	Total heat per lb. of producer fuel, B.Th.U.	12,150	12,100	12,300	12,100	12,000	12,000	11,900	12,000
33	Heat delivered to combustion chambers at 86 per cent producer efficiency, B.Th.U.	10,450	10,400	10,600	10,400	10,300	10,300	10,250	10,300
34	Heat in gases entering boiler(s), B.Th.U.	6,750	7,010	7 000	7,140	6,000	5,080	5,500	4,980
35	Heat as steam, B.Th.U.	4,850	5,200	4,975	5,025	4,360	2,850	3,340	2,900
36	Steam as percentage of total heat in producer fuel—see (35) and (32)	40	43	40·3	41·5	36·5	23·75	28	24·2
37	Steam as percentage of heat in waste gas flue—see (35) and (34)	72	74·25	71	70·4	72·7	56	61	58·2

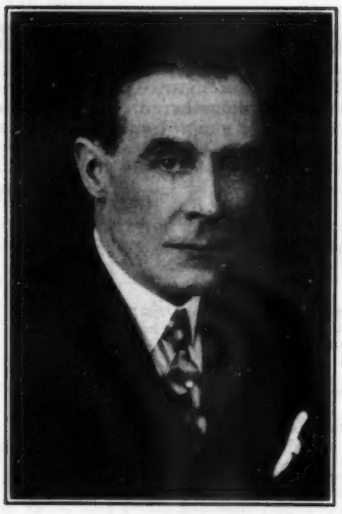
NOTE.—(33) to (35) all calculated per lb. of producer fuel.

The Preparation, Marketing, and Utilization of Coke

by

W. L. BOON, M.I.Mech.E.,

Manager of the London and Counties Coke Association



W. L. BOON.

By birth a Lancastrian, Mr. W. L. Boon gained his early engineering experience in Bolton and Manchester. He worked abroad for Messrs. J. & P. Coats, the textile manufacturers. During the early part of the war he was in Russia, and was retained there by the Government. Later he served with the army, and went to Siberia with the special mission headed by General Knox. Mr. Boon was an early pioneer of pulverized fuel firing for the metallurgical applications for which purpose it is still admirably suited, and was appointed Technical Adviser to the London Coke Committee, following which he took up his present appointment as Manager of the London and Counties Coke Association. He is a Member of both the Institution of Mechanical Engineers and the Institute of Fuel.

The subject of the Preparation, Marketing, and Utilization of coke deserves the close consideration of every undertaking producing coke for sale, for the receipts from coke and the revenue of the undertaking can be substantially increased by a full appreciation of the problems entailed.

In the public mind, coke is not yet sufficiently distinguished by degrees of quality; and care in preparation, grading, and servicing are not appreciated in the measure which they deserve. It will take some time completely to dissipate the prejudice which has been inherited as a legacy from the days when coke was an unsatisfactory product. But that great progress has been made is evidenced by the status which coke has achieved at the present day. In two decades it has advanced to a prominent position in the commodity market, from being in fact almost a waste product, while from the aspect of revenue it is to the Industry second only in importance to gas. Much more remains to be done if full advantage is to be taken of the markets which are available and can be developed, and for which gas coke is logically well suited.

There should be no anomaly in the Gas Industry selling successfully two fuels, gas and coke, regarded in some degree as competitive; a wise policy will develop coke as a complementary and remunerative supplementary fuel to gas. There are those who believe that the Gas Industry cannot continue successfully to sell an inferior and relatively crude solid fuel in this way and who hold the view that money expended on the careful preparation of coke is uneconomic. An impartial and clear view of the future must surely indicate that solid fuel will be used in this country for many decades to come. The convenience factor of gas, whilst recognized, remains costly, and it would be an exaggeration to envisage the possibility of gas becoming, in our day at least, always comparable in cost with coke. What is more probable, is that if the Gas Industry ceased to supply coke, the effect would be to engender competition in the shape of gas made by the producers of smokeless fuels, the demand for which would enormously increase as a direct consequence. The general view points towards a profitable future for smokeless fuels, and the Gas Industry should be stimulated by the growing and strengthened demands to make the best of its opportunities.

The gas undertakings of the country sold 7¼ million tons of coke in 1934 without serious sales effort, the Industry concentrating its energy on its sales of gas, coke being relatively and disproportionately neglected.

Expenditure on plant and the efforts of the works' staff to produce a higher and better quality product will be gravely discounted if the marketing of the commodity is not equally well studied and developed. The fact that gas coke has sold relatively so well in recent years is of no great credit to the sales effort expended upon it by the Gas Industry as a whole. It is due rather to the inherently beneficial characteristics which coke naturally possesses as a fuel; a circumstance capable of exploitation to greater advantage than has generally been the case.

It is, in fact, essential that the Gas Industry should take full advantage of all and every means to increase its revenue from coke because of the effect that this would have on the price of gas, to which at present coke contributes between 1½d. and 2d. per therm. Unlike gas, no undertaking has any monopoly on the sale of coke in its own area, so that not only has coke to compete with other fuels, but it has to compete with any coke sent into the area by other producers. The necessity for a better and more intelligent sales policy for coke is pressing, and the future can be regarded confidently if action is taken.

It is obvious that the quality of coke depends upon every phase of its production, but it is the purpose of the author to commence this Paper with the preparation of the fuel after its discharge from the retorts. It should be understood that the experience of the author is concerned principally with coke produced by gas undertakings in London and the Home Counties, so that his views are perhaps coloured by circumstances peculiar to those areas.

Thanks must be expressed to certain gas undertakings which have so kindly placed their records at the disposal of the author. It will have been realized that a great deal of the material used for the purpose of this Paper has been taken from the records of the London and Counties Coke Association, whose courtesy in permitting its publication is very gratefully acknowledged.

PREPARATION OF COKE.

Wet quenching, however improved, is productive of a greater amount of breeze and dust than would be the case with dry cooling. The sudden shock of cold water spraying disintegrates the coke by splitting up the cell structure and consequently lessens the proportion of large coke.

The cost of operating a water quenching method is a factor of importance. As an average figure, the total amount of water required in water quenching is about 1½ tons per ton of coke, so that the pumping costs are considerable; in addition to this, water quenching has always the disadvantage of producing large clouds of water vapour carrying with it sulphuric acid gases which are detrimental to steel work with which they may come in contact.

Natural development seems to tend towards the adoption of a more stable and efficient method of dry quenching or cooling whereby the sensible heat in the fuel is utilized and which would serve the dual purpose of producing a perfectly dry fuel, and obtaining a steam service for gas works' utility.

The unit chamber type with ring boiler is probably the most up-to-date type of dry cooler which has been evolved. The circular container is transferred into what may be termed the flue of a drum type boiler for cooling.

This type of plant is applicable to coke batches up to about three tons. It is therefore particularly suitable for small gas works, although it can equally well be applied in larger undertakings.

For coke batches up to 10 cwt. the heat transfer is effected solely by radiation. For larger batches the units are

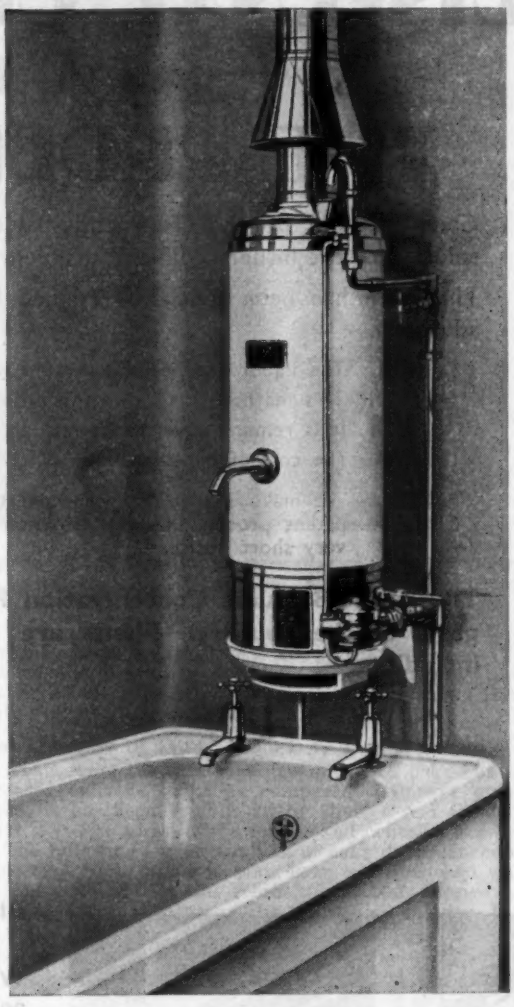
trouble-

free

service

from

the



G·L·C

Single Point WATER HEATER

The eminently practical design and sound construction of this Heater have ensured an efficient service which never fails to provide a constant supply of hot water.

The following fittings are included:—

AUTOMATIC VALVE and GOVERNOR Operated by turning on the inlet water supply. Gas cannot pass through to the main burner until water is flowing through the Heater.

BAFFLER The G.L.C. improved pattern.

WALL BRACKET and DEPOSIT TRAY Finished in Porcelain Enamel.

The G.L.C. Heater is finished with a White Enamelled Exterior and Chromium Plated fittings. The exterior can also be supplied in Green or Blue Enamel.

The G.L.C. Single Point Water Heater has been specially designed by The Gas Light & Coke Company for the supply of Hot Water to the bath or at any other point where an instantaneous and constant flow is necessary.

MAIN

The G.L.C. Heater is manufactured under licence by R. & A. Main Ltd., who have made a special study of the production of modern gas water heating appliances.

R. & A. MAIN LIMITED, LONDON AND FALKIRK

London Office and Showrooms: 48, Grosvenor Gardens, S.W.1. Glasgow Office and Showrooms: 82, Gordon Street

DISPOSAL OF GAS LIQUOR
— AT A PROFIT!
THE PROBLEM SOLVED.

Concentration by the Thorncliffe-Baldurie process is a completely satisfactory solution to the hitherto difficult problem of the treatment and disposal of Gas Liquor.

This plant has been specially designed for the work and has these demonstrable advantages :—

1. The liquor can be concentrated without expenditure of labour for plant operation.
2. This method turns a vexing problem into a trouble free process.
3. It is remunerative, profit making.
4. The cost of the installation of the complete plant is relatively very low.

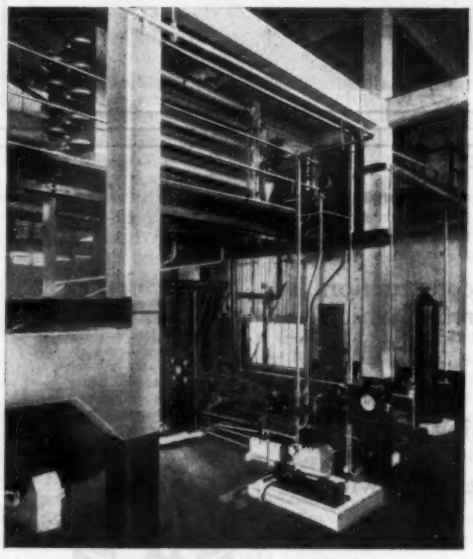
NOTE :—We make a speciality of converting existing sulphate of ammonia plants to this patent process, making provision for reversion to the manufacture of sulphate at very short notice.

Thorncliffe-Baldurie Concentration Plants are being rapidly installed in all parts of the country. Plants are already in operation in many places, including :—

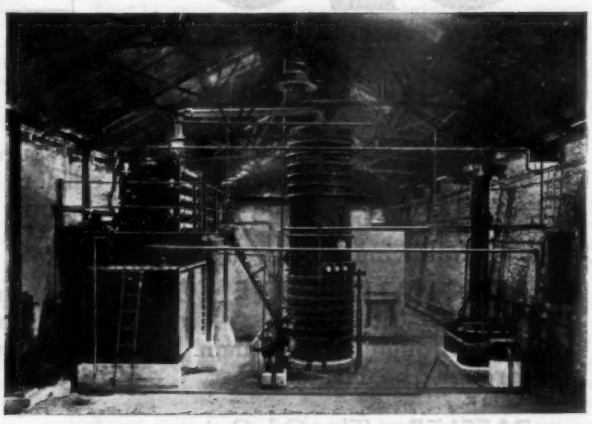
CAMBRIDGE	GLASGOW (3 installations)
EDINBURGH	HASTINGS
BOURNEMOUTH	PLEAN
DEVONPORT	LEA BRIDGE
DUNFERMLINE	LEATHERHEAD
WATFORD	NORTH BERWICK
MOTHERWELL	BLACKBURN
STOCKPORT	ETC., ETC.

Plants at present on order for :—
MANVERS MAIN COLLIERIES LTD., WOKING.

We shall be glad to investigate YOUR problem and submit our proposals for your consideration.



Thorncliffe-Baldurie Plant at Bournemouth—
Capacity 150 tons of Liquor per day.



Thorncliffe-Baldurie Plant at Devonport—
Capacity 60 tons of Liquor per day.

MANUFACTURED IN ENGLAND BY
NEWTON, CHAMBERS & CO., LTD.,
THORNCLIFFE IRON WORKS - - - - - - - - NEAR SHEFFIELD.

AND IN SCOTLAND AND NORTHERN ENGLAND BY
HENRY BALFOUR & CO., LTD.,
LEVEN, FIFE.

Dickson

FIGURE 1.—*Unit Type Cooler with Coke Cage for Hand Operation; view shows Cage receiving Charge of Hot Coke.*

equipped with gas circulation and thus the heat is transferred partly by radiation and partly by means of the cooling gases.

One plant has been in operation since 1929 and has dealt with 6,600 tons of coke. Operating expenses have been extremely low as no power or additional labour is required to work it. Maintenance for 5½ years has only required 155 Swiss francs. There are even smaller units than these for dry cooling available, and illustrations of a completely manual system are given in Figures 1 and 2.

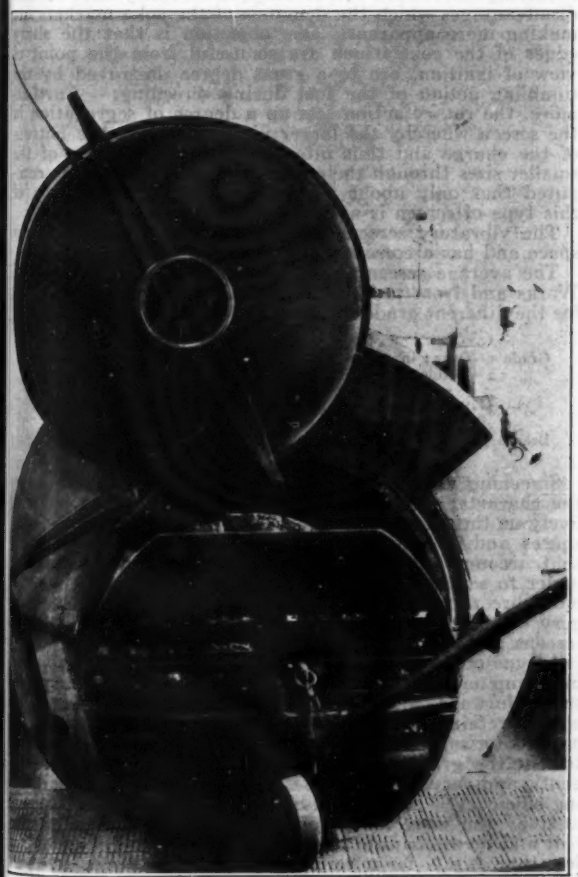


FIGURE 2.—*Unit Type Cooler with Hand Operated Coke Cage being pushed into Cooling Chamber of Boiler.*

In this arrangement, after a charge has been placed in the cooler, the drawbar is detached from the carriage and the boiler lid closed. After cooling, the coke basket is taken into the yard and emptied simply by tipping it.

IMPROVEMENT OF COKE QUALITY BY DRY QUENCHING.

Apart from the fact that dry quenched coke has an increased calorific value as compared with wet quenched coke, it has been established by shatter and screen tests that it is also physically stronger and contains less breeze.

The following screen analysis of coke dry quenched in a unit type plant and the same coke wet quenched was obtained at the Zurich Gas Works during tests carried out by Dr. Schläpfer, Director of the Swiss Fuel Institute:

TABLE 1.—*Screen Analysis of Dry and Wet Quenched Coke.*

1	2	3	4
Oven No.	7	15	17
Charged	2.57 a.m.	12.29 a.m.	4.10 a.m.
Discharged	7.30 p.m.	5.0 p.m.	8.42 p.m.
Method of quenching	Wet	Dry	Dry
Total weight of coal, kg.	8,440	8,400	8,450
Total weight of coke, kg.	6,930	6,260	6,141
Coke made in per cent. of coal charged	82·2	74·5	72·6
Per cent. on 2½ in.	61·5	61·8	66·0
,, on 1½ in.	22·3	26·5	20·8
,, on 1 in.	7·3	5·7	6·0
,, on ⅝ in.	2·8	1·7	2·0
,, through ⅝ in.	6·1	4·3	5·2

The coal mixture used was:

About 42 per cent.	" Neumühl "	(Ruhr)
,, 42 ,,	" Horden "	
,, 16 ,,	" Saar "	
100 ,,		

And the chemical composition of the mixture was:

Carbon,	about 62·6 per cent.	
Volatile matter,	,, 25·5	,,
Ash,	,, 6·5	,,
Moisture,	,, 5·4	,,
	100·0	,,

It will be noticed that the wet quenched coke contains a greater percentage of smalls below 1 in. Owing to the fact that in the wet quenched sample a portion of fine breeze and dust was carried away in the quenching water and in the quenching vapours, and could not be measured, and further that some of the dust adhered to and was weighed with the large coke pieces, the actual difference is greater than is shown by the above figures.

MOISTURE IN COKE.

In many instances dry quenched coke is slightly sprayed with water on discharge from the cooling plant in order to lay the dust and to minimize dust emission at later stages

of handling and in the consumers' bin. As the quantity of water added in this way is very small, the coke, to all intents and purposes, is still a " dry " product, and it is found that this moisture can be kept fairly uniform over the various coke sizes. This feature contrasts very strikingly with the great irregularity of water content in the various sizes of wet quenched coke.

At Zurich Gas Works the coke, after dry cooling, is discharged on a wharf and sprayed with water. The moisture content is regularly ascertained and below are given the results of three tests carried out at these Works. The coke pieces were not specially selected.

TABLE 2.—*Moisture Content of Dry Quenched Coke (Water Sprayed)*

Coke Size.	Moisture Content, Per Cent.		
	Test, 16 March, 1933.	Test, 31 Jan., 1933.	Test, 11 April, 1933.
1	2	3	4
15 × 25 mm.	1·4	1·3	2·7
20 × 40 ,,	0·8	..	1·5
40 × 60 ,,	0·6	0·4	2·3
60 × 90 ,,	0·6	0·5	0·6

STEAM PRODUCTION.

The sensible heat contained in incandescent coke discharged from coke ovens at about 1,800° F. represents approximately 37 per cent. of the total heat consumed by carbonization. Taking the quenched temperature at 60° F. the B.Th.U. lost per ton of coke cooled are 1,169,280, and if this heat were profitably utilized it would be possible to raise a theoretical maximum of 1,210 lb. of steam per ton of coke. In general practice the steam quantity produced has actually varied between 800 and 1,200 lb. of steam from and at 212° F.

The purchase value of a dry cooling plant is difficult to assess on any common basis because of the necessity of installing these systems to suit the particular site and type of plant in conjunction with which it has to work, so that the auxiliary plant may conceivably be much more costly in one case than in another. The net cost of production of steam can, however, be represented on the following basis :—

Interest, depreciation, and maintenance at	12 per cent.
Power charge	0·5 pence per unit
Labour for attendance	16 pence per hour

Cost of steam production per 1,000 lb. from and at 212° F. = 6 pence to 9 pence for large installations, and 12 pence for small installations, depending upon the capital charges.

It will be noted that no credit is assumed for the direct improvement in coke quality, although it is logical to conclude that the benefits which would accrue in this direction are capable of monetary assessment.

CONVEYING.

The conveyance of coke from one section of a plant to another is in many respects a much more important function than it was hitherto thought to be, and the problem of producing a scientifically thought out system of machinery for conveying, grading, and screening, is a very material factor. The two great points underlying the considerations of handling are abrasiveness and friability. On the one hand, the machinery must be of sufficiently rugged and substantial character to have lasting qualities, and, on the other hand, the material itself must be handled as gently as possible to prevent degradation.

A very apt description, given at the World Power Conference of 1928, refers to coke as having the characteristics of an egg, an emery wheel, and a sponge—indicating the care with which the material must be handled, the wear which is set up by its abrasive action, and the absorbent qualities of the fuel.

An important factor in the design of any coke handling plant is, first, clearly to visualize the behaviour of the coke throughout its passage and treatment. From the time the coke is formed in the ovens or retorts to the time it is ultimately put to the consumer's use, some breakage and consequent breeze production is taking place. It is necessary, therefore, that the machinery employed shall obviate shock, prevent attrition, and effectively handle the product with a minimum of breakage.

CUTTING AND SCREENING.

The cutting of coke, whilst adding to the breeze production, improves its sales value inasmuch as the sharp fracture produced by cutting is definitely of utility for easy ignition, an important point, particularly with gas coke used in open domestic grates.

The screening system employed in a modern Works is tending towards the treatment of the unscreened quenched coke after leaving the carbonizing plant by first scalping it over relatively small screens, the size of which will, of course, be fixed in accordance with the requirements of the system. Everything passing through this screen should be retained for works purposes and if necessary separated by means of additional screens into fuels for: (1) boilers, (2) retort houses, (3) other works purposes.

The size of the scalping screen will be determined in accordance with circumstances, and in some of the London Works is arranged between 1¼ in. and 1¾ in. square mesh.

It is recognized, of course, that where the whole of the coal carbonized has a relatively low ash content, simple screening may produce a very satisfactory coke for domestic purposes without scalping or ultimate cutting.

Where a scalping screen is used, the large coke which passes over this screen then goes on to the main screening plant for separation into the various grades. This scheme has the advantage that the small coke which usually contains not only a high proportion of ash, but also of " bats," is returned to the Works plant for fuel purposes, only the large coke containing a lower proportion of moisture and ash being allowed to go forward for sale.

As an illustration of the relative proportions of ash likely to be found in different grades, the following analyses are interesting. The samples examined were of coke made from South Yorkshire slack with rather high ash content which tends to emphasize noticeably the differences, but there is no reason to suggest that the principle is in any way affected.

	Dry Basis.
Ash in coke—	
Grade 1 (over 1⅝ in.)	7·9 per cent.
,, 2 (1⅛ in.–1⅝ in.)	9·6 ,,
,, 3 (1⅛ in. – ¼ in.)	16·2 ,,
Breeze (under ¼ in.)	25·8 ,,
Unscreened coke.	12·7 ,,

With regard to the types of screens used, the rotary, jigging, reciprocating, and balanced high-speed vibratory screens are all types which are used effectively, singly or in conjunction, either as single deck or as multiple deck units. Whilst a number of the older types of rotary or revolving screens are still retained in use, they have certain disadvantages which the demands of the coke markets are making more apparent. One objection is that the sharp edges of the coke which are so useful from the point of view of ignition, are to a great degree destroyed by the tumbling action of the fuel during screening. Furthermore, the rotary action sets up a degree of segregation in the screen whereby the larger pieces travel to the bottom of the charge and thus interfere with the passage of the smaller sizes through their respective openings. It is computed that only about 20 per cent. of the total area of this type of screen is active.

The vibratory screen, on the other hand, requires less space and has a considerably greater efficiency.

The average screening efficiency obtained at a series of Works and from the better known vibratory screens are, for the different grades of coke, as follows :

Grade 1—Over 2 in. square mesh	87 per cent. efficiency	
,, 2—Within the limits of 1 in. to 2 in. square mesh	97 ,,	,,
,, 3—Within the limits of ¼ in. to 1¼ in. square mesh	95·4 ,,	,,
Breeze	100 ,,	all through

Screening efficiency is to some extent dependent upon the character of the coke being treated. A hard coke is lively on the screens and bounces at points of delivery into shutes and feeders, and is possibly more destructive on that account. A friable dry coke on the other hand is easier to screen and less abrasive in its action, but makes more breeze and requires more careful handling. A fingery coke is troublesome in plugging up the mesh of the screens and causing fouling in feeders.

A type of screen which is finding considerable favour is made up of a series of perforated rubber sheets which travel forward, alternating into valleys and ridges. The coke is retained on the sheets by louvre side plates and is carried forward over the perforations, which are of sizes to suit the grade required. The handling of the coke is gentle and very little breeze is produced, whilst the screening efficiency is good because blinding of the mesh is obviated by the wave action of the belt. The design of the belt and its mechanism is simple and the power required is less than 2 H.P. for a screen capable of 10 tons per hour throughput.

This screen can in effect be used as a conveyor and to a limited degree as an elevator with an inclination up to ten

degrees. Working results obtained after three years of daily operation on a 10 ton per hour unit screening two sizes through and using cut coke from continuous vertical retorts show the very low maintenance figure of 1·8 pence per ton of screened coke.

One of the most efficient of the non-vibrating screens employing a mechanical action consists of a nest or battery of triangular plates rigidly fixed to a series of parallel shafts, all driven at the same speed. The plates on adjacent shafts are arranged to mesh and are spaced in accordance with the size of product required. The action of the revolving triangular plates imparts a forward and a turning over motion to the coke, allowing easy separation of sizes without any fouling of the screen or harsh treatment of the product.

Cost of Graded Product.

The cost of screening coke to the various sizes depends considerably upon the ancillary plant and the system which is employed. The position of the screens, the method of storage, the amount of re-handling which the peculiarities of a site may demand, all have a very natural bearing on the ultimate cost of sized products.

To obtain representative costs of grading coke has proved a difficult matter, because of the diverse conditions and types of plant used, and the different costing systems employed. From the examination of the plant and records of ten separate gas undertakings the figures in Table 3 may be taken as representative.

To the charges detailed in Table 3 must be added the cost of de-breezing, weighing, bagging and loading into wagons, the costs for which will vary with the type of de-breezing systems in use, whether piece work or day rates are paid for labour, and with the degree of convenience of

Table 3.—*Cost of Grading in Pence per Ton of Coke and Breeze Produced. Coke Scalped through 1 In., all over 1 In. cut and screened into three grades through, and one over.*

Screening—Repairs and Maintenance (Wages and Material).	Coke Cutting—Repairs, Maintenance, and Power.	Plant Attendance.	Power for Scalping and Screening at 0·5 Pence per Unit.	Total Cost, excluding Standing Charges.
1	2	3	4	5
Large Plants Up to 275 Tons per Day.				
1st series—				
5·60 (5 yrs. average)	1·74	1·3	0·25	8·89
2nd series—				
5·80	1·9	2·4	0·35	10·45
3rd series—				
6·0	1·93	2·2	0·48	10·61
Small Plants Up to 175 Tons per Day.				
1st series—				
7·18	1·86	2·0	0·39	11·43
2nd series—				
2·24	1·91	1·2	0·36	6·71
3rd series—				
1·8 (rubber screens)	1·8	1·2	0·05	4·85

the loading system, &c. The lowest rate for this service from the same series of installations examined gave 5·3 pence per ton, which is a piece work rate for the loaders and includes the charge of a foreman. An average figure for the same duties but with labour at day work rates gave 7·8 pence. The highest cost, again at day work rates, was 11·6 pence. It would be permissible, therefore, to take the figure of 7·8 pence as a representative loading charge, so that a final figure of cost can be arrived at.

Power driven de-breezing screens at hopper outlets are coming into more general use; the static or bar screen is not considered to be efficient enough to ensure a sufficiently clean product. It is therefore necessary to take the power and maintenance charge of debreezing screens into account in arriving at a total cost for coke preparation.

The power and maintenance costs for de-breezing screens of the high speed vibratory type taken as an average from a series of plants are equivalent to a charge of 0·25 pence per ton of coke and breeze handled. On the basis of the foregoing figures the cost of cutting and grading coke for the modern domestic trade would approximate to the results given in Table 4.

The assessment of standing charges can only be taken as approximate, while the conveying charges are general averages only, as the plant employed in each Works varies to such a great degree that a common basis of comparison is

Table 4.—*Cost of Cutting and Grading in Pence per Ton of Coke and Breeze Handled.*

Total Grading Costs from Table 3.	De-Breezing Cost, Power, and Maintenance.	Standing Charges, Interest on Investment, Depreciation, &c.	Conveying Plant, Maintenance, Power and Standing Charges.	Loading Charge.	Total Charge per Ton of Graded Product for Handling, Screening, Bagging.
1	2	3	4	5	6
8·99	0·25	6·5	4·0	7·8	27·54
10·45	0·25	6·0	3·5	7·8	28·0
10·61	0·20	5·5	3·0	7·8	27·11
11·43	0·20	5·0	3·0	7·8	27·43
6·71	0·2	4·5	2·5	7·8	21·71
4·85	not representative				

rendered difficult. Table 4 is therefore given with some reserve and can only be considered as reasonably representative.

Breeze Production.

The price to be paid for the production of a high quality coke is not only consequent upon the cost of its treatment through the screening plant, but also upon the amount of degradation which it suffers in its passage through the system. The difference between coke input to the plant and coke for sale output from the plant is shown in Table 5,

Table 5.—*Breeze Production during Coke Preparation.*

—	Minimum Production, Per Cent. of Total.	Maximum Production, Per Cent. of Total.	Average Production, Per Cent. of Total.
1	2	3	4
(*a*) The breeze production by quenching and transport to the screens	4	10	7
(*b*) The amount extracted at the scalping screen (all through 1½ in.), including (*a*) . .	6	14	10
(*c*) The breeze produced by cutting	15	35	25
(*d*) The breeze produced by screening			
(*e*) The breeze produced by stocking or bunkering . .			

which indicates, on the average figures, that 35 per cent. of the original make of coke has been sacrificed to a low value fuel to obtain 65 per cent. of high value product. A first impression of these figures may well raise the question of whether grading coke is worth while. There is no doubt, however, that the results obtained from all undertakings are so conclusive in their evidence of justification that no uncertainty can remain as to the benefits of coke preparation.

Breeze Sale and Disposal.

Apart from the requirements of the actual Works producing breeze, there is a considerable quantity available for disposal, and prior to 1918 the demand for breeze was considerably less than the quantity available for sale. Further, the price realized from its sale was below 5s. per ton, and the difficulty was to sell it even at that price. In 1918, however, a considerable improvement took place in the breeze position by the institution of E. W. L. Nicol's patent sandwich system of fuel feeding for large chain grate mechanical stokers which essentially provides for coal and coke to be fed on to the grate in alternate layers. The London Coke Committee was largely responsible for this development and the first installation was made at the Greenwich Power Station.

This method helped considerably to curtail the smoke emission from the boiler chimneys and also resulted in considerable economy of steam production. It also cured immediately the breeze problem, particularly for those undertakings within the reach of Power Stations. The present annual consumption of breeze by the London Power Company amounts to over 90,000 tons. According to the 14th Annual Report of the Electricity Commissioners the coke and breeze consumption at electrical generating stations now exceeds 230,000 tons per annum.

These markets have become stabilized for breeze in the London area and its absorption in this way has had the effect of facilitating the substitution of waste heat boilers at gas works instead of breeze-fired boilers. The proportion of coal and coke used under this method is varied in accordance with the best conditions of operation, the blending of mixtures being simple and flexible. The system has

been extended until at the present day there is practically no breeze available for sale in the London area.

Storage, Segregation, and Degradation.

The storage of coke is a factor which causes considerable anxiety to the producer and the salesman alike. The amount of degradation and segregation which takes place at this stage makes it frequently the cause of complaint.

The discharge of coke from the screens at a high elevation into very deep bunkers is to be deprecated, because of the resultant excessive breakage.

It would seem futile to install an expensive equipment in order to grade coke into a series of defined sizes and then to destroy some of this careful and costly work by breakage due to the act of putting the fuel into stock. The degradation which is consequent upon storage is not only due to the discharge of the material from the screens into the bunkers in the process of filling them and the breakage due to attrition of the pieces by rolling one upon another, but also to the fact that in the discharging of the fuel from the bunker itself a grinding action is set up accompanied by rotation of the pieces under pressure; this takes place practically throughout the whole mass when the exit gate at the bottom of the hopper is open.

The nature of coke is such that whilst it would appear impossible to eliminate breakage and dust formation entirely, it is practicable to reduce bunker degradation to a considerable extent.

The breakage due to the filling of fuel into the hoppers is easily understood because it is visible to the eye, but that occurring in the discharging is not so well appreciated.

The use of spiral chutes for filling hoppers has undoubtedly proved of advantage as the system is growing in popularity, and it is logical to suppose that the necessity for some means of allowing the fuel to be deposited into the bunkers without the long drop must justify itself.

A discharge apparatus which has been used with some success consists essentially of a number of vertical members spaced around in a circle and directly over the hopper outlet. The distance apart of these vertical members is such that an arching action takes place from one member to another, which is strongest at the bottom and without effect at the coke surface. This results in discharge from the upper surface of the coke, permitting a free column of material to pass through the main body to the exit, the column constantly being replenished from above as the hopper discharges.

As the action of discharge is such that sections from the coke surface pass continuously and directly towards the outlet, there is an automatic re-mixing of sizes so that any segregation that has taken place is to a certain degree re-adjusted.

De-breezing.

The provision of de-breezing screens at the point of loading coke for distribution is necessary if a good product is desired, and power driven de-breezing units are becoming more essential as the demand for a better and cleaner coke becomes more insistent. Whilst the static de-breezing screens are still in use in a large number of plants, they are not as effective as the vibratory screens and suffer to a much greater extent from avalanching than does the mechanized unit.

In the majority of coke plants which have been erected within the last two years, de-breezing screens of the power driven type have been almost universally used. The fact that degradation may be substantially minimized by a filling and discharging device inside the bunker would not obviate the necessity for de-breezing prior to bagging, particularly when the domestic markets are being serviced. Further, the speedy loading which is to-day essential, necessitates a high capacity screen.

Grades and Nomenclature of Coke.

Considerable controversy has surrounded the question of grade sizes and the possibility of adopting a national nomenclature for coke. It was realized in the early days of the London and Counties Coke Association that standards should be laid down and the Technical Committee of that Association, after very lengthy consideration of the problem, recommended to all its members the adoption of the following names, numbers, and sizes for graded coke:—

Name.	Number.	Size.
1	2	3
Large or unbroken coke	1	Over 2 in. (square mesh)
Broken coke	2	Within the limits of 1 in. to 2 in.
Coke boiler nuts	3	" " " ½ in. to 1½ in.
Forge beans	4	" " " ⅜ in. to ¾ in.

These grades have been used by the majority of gas companies in London and the home counties area for some three years and have been generally regarded as sufficient and satisfactory.

A questionnaire reviewing this whole matter has this year been circulated to 152 gas undertakings. The answers indicate that the system which the Committee originally suggested has fulfilled their requirements, and it is the general opinion that it is unnecessary to sub-divide further these sizes or to alter the nomenclature.

It would be of great advantage if a more general use could be made of this nomenclature, even supposing that it may have limitations. The trade still suffers from a great variety of names which have grown up in districts by ancient usage, and which are not conducive to good marketing or compatible with the needs of the Industry. The use of such terms as apples, chestnuts, potatoes, &c., are to be deprecated as causing unnecessary confusion.

MARKETING OF COKE.

Markets, Present and Future.

The present-day marketing of gas coke is divided between the distributive trade and the producer. Many gas undertakings have equipped themselves to distribute their own product, or a proportion of it, directly to their own consumers; particularly is this the case with the larger producers, although in nearly all cases a considerable proportion of the output is still sold through merchants, while in many of the small gas undertakings merchants distribute practically the entire output.

The main coke markets come within four categories, (*a*) domestic, (*b*) industrial, (*c*) central heating, (*d*) export, the demand in the first three influencing the quantity dealt with in the last.

The coke produced by the gas undertakings of the country is tending to go more for inland sale, and whilst the export market has been maintained, the tendency is for the quantity to be curtailed in favour of the home markets.

The latest available returns give the annual export of coke at 813,601 tons, and the production of gas coke for sale at 7,500,000 tons, so that the home market consumes 6,786,399 tons, of which 2,700,000 tons, or nearly 40 per cent., was accounted for in London and the home counties area. The trade is divided approximately in the following proportions:—

Domestic coke boilers (heating and hot water)	47	per cent.
Central heating (large scale)	35	"
Industrial	14	"
Domestic open fires	4	"
	100	"

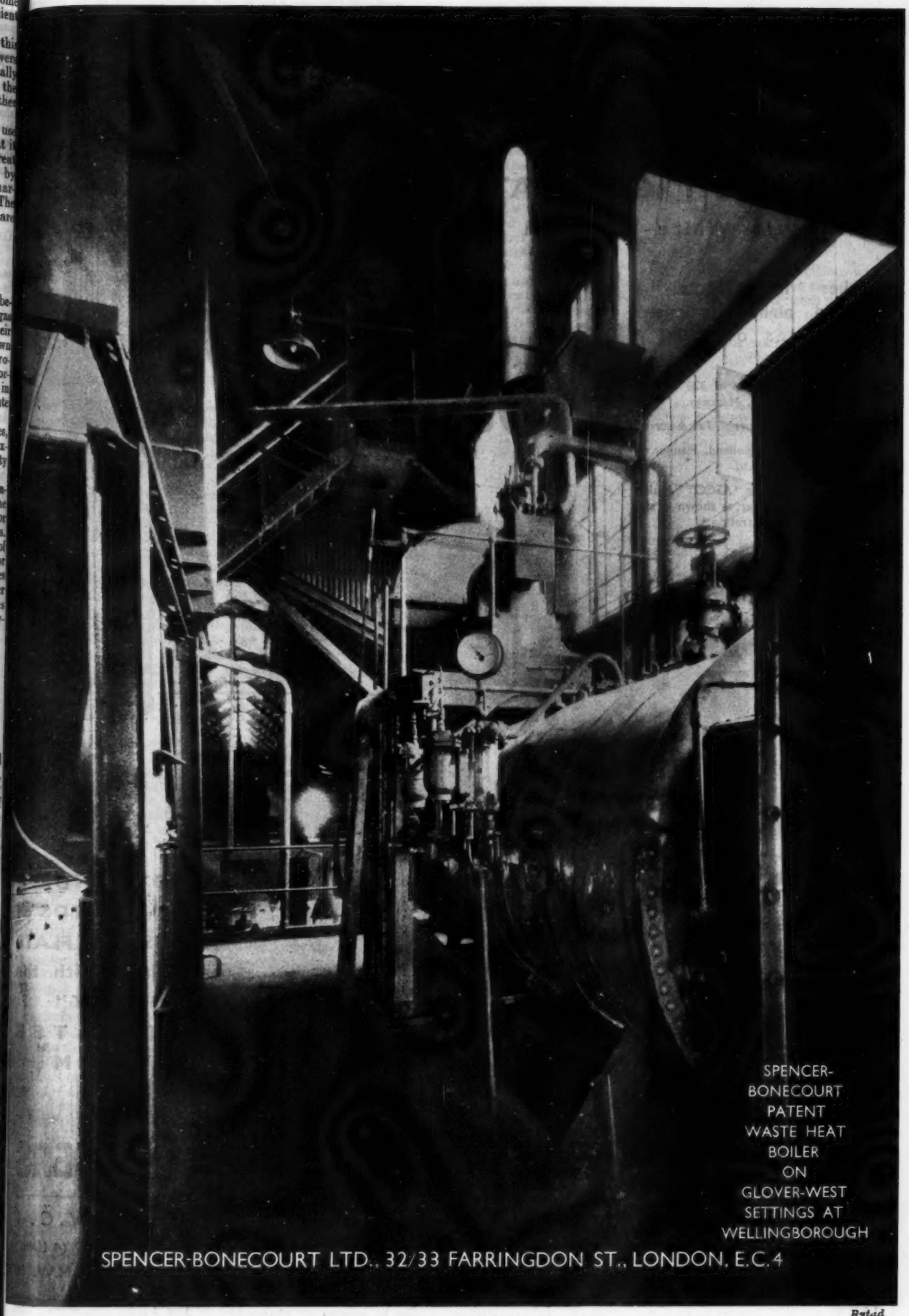
An analysis of these figures is very illuminating; it will be seen that, of the total, 51 per cent. goes to domestic use, 47 per cent. to the well-established domestic hot water boiler field and only 4 per cent. to the open coke fire. If this is taken as a representative figure for the country, we find that 271,455 tons of gas coke is being used in open fires, whereas the consumption of coal in the same market is about 40 million tons, so that in this trade we supply less than 0·68 per cent. of its requirements. If the public tendency is towards the use of smokeless fuels for its open fires it does not appear as if the Gas Industry has yet taken advantage of that fact.

The merchant is usually the purveyor of all solid fuels and it cannot be expected that he is going to interest himself in bringing the benefits of the coke fire to his customer's attention, even supposing that he knows of it.

The merchant is not generally a salesman in the creative sense however well he may serve established markets, so that where gas undertakings are relying on merchants for the disposal of the greater part of their coke, the development of new markets may be restricted.

The Gas Industry needs to sell its coke advantageously, but there is no evidence that it has generally mustered sufficient enthusiasm to do it effectively. Coke appliances, for instance, are seldom in evidence in showrooms; if they are, they are mostly inoperative. The showroom staff does not encourage coke inquiries and has enthusiasm only for gas appliances. Coke in dusty cases, years old, is exhibited as samples of the grades supplied; no advertising matter beyond a price card is considered necessary. This is perhaps a severe indictment on the Industry, but it is a fair criticism. No matter how good the product is, it will not sell itself, and our coke advertising is woefully inadequate. The amount of money expended in direct coke advertising by the London and Counties Coke Association (which probably spends more than any other body) represents $\frac{1}{15}$ of a penny per ton of coke sold. It is only surprising that so much has been achieved with such a small outlay.

The future markets for coke lie very specifically in the


SPENCER-
BONECOURT
PATENT
WASTE HEAT
BOILER
ON
GLOVER-WEST
SETTINGS AT
WELLINGBOROUGH
SPENCER-BONECOURT LTD., 32/33 FARRINGDON ST., LONDON, E.C.4

Rytad

'ASCOT'

MULTI-POINT GAS WATER HEATER

Finished in White-Porcelain Enamel—Bright Parts Chromium-plated

Supplies Instantaneously — day and night — unlimited quantities of really

Hot Water

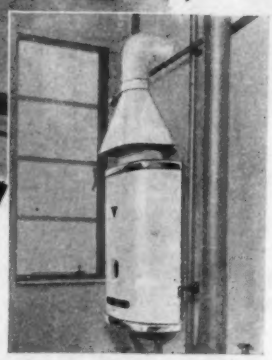
for **HOUSES** and **FLATS**

"Evelyn Court." Blocks of 320 flats at Amhurst Road, Hackney.

Architects: Sir John Burnet, Tait & Lorne.

Contractors: Messrs. Holland, Hannen & Cubitts, Ltd.

Each flat is fitted with an "ASCOT" Multi-Point Gas Water Heater, as shown in the lower illustration.



PART OF THE KITCHEN

THOUSANDS & THOUSANDS of HOUSES & FLATS are fitted with the "ASCOT" HOT WATER SYSTEM

ASCOT GAS WATER HEATERS LIMITED

244, HIGH HOLBORN, LONDON, W.C.1

Telegrams: GASCOT, LONDON *Phone: HOLBORN 7107 (4 LINES)*

Works: NORTH CIRCULAR ROAD, NEASDEN, LONDON, N.W.10

SOLVE EVERY DOMESTIC WATER HEATING PROBLEM

extension of the domestic trade and central heating, and if the tendency towards the increasing use of smokeless fuels in the household is maintained, the impetus to the use of gas coke should be steady and considerable, primarily for the open grate.

The distributive trade through merchants is a very old and well-established business, and the merchant normally deals not only with coke but with a full range of solid fuels, *i.e.*, coke, coal, and anthracite, so that from this aspect he offers to consumers a disinterested service. On the other hand, the consumer argues that the coke producer has only one fuel to sell, whereas the function of the distributor or merchant is to bring to the notice of the consumer the most suitable and economical fuel for the consumer's particular need. In the London area the merchant has undoubtedly cultivated a market for colliery oven coke. The Industry itself possesses no selling organization and has had very little constructive policy for the initiation of its sales in a strange market.

Co-operative effort between the distributive and producing trades seems an ideal arrangement which is not only feasible, but essentially sound in practice, as is exampled by the measure of success which has attended the working arrangement between the London and Counties Coke Association and the merchants throughout their area.

Distributing Cost and Revenue.

The price obtained for coke in the home market fluctuates in different parts of the country, but in London and the home counties where the prices are stabilized, the producer dealing direct with the consumer would obtain a range between 30s. and 40s. per ton delivered. Assuming an average retail price of 34s., which would include the cost of sacking, loading, transport, stocking costs, and invoicing, the net yield to this undertaking is about 23s. per ton.

The smaller graded nut sizes bring in a larger gross return and would retail at an average of 41s. 8d. per ton, but owing to the loss in pretreatment, such as cutting, screening, de-breezing, &c., and the additional cost of this processing, the net yield will not be much greater than for large coke.

Whilst the net yield of the domestic markets shows a return to the producer of 23s. per ton, the London undertakings which are particularly concerned with export, may, consequent upon the lower prices in this market, have their gross returns reduced to 21s. per ton.

Fluctuation in Demand and Supply.

To a very great degree all coke markets other than industrial, are of a fluctuating character, depending upon weather and season, so that adequate catering for them presents no easy problem. It necessitates the carrying of large stocks and the ready response to sudden and urgent demand for comparatively large quantities. It is not always feasible that sufficiently large stocks be carried by any undertaking, as space occupied by the fuel is valuable. Considerable flexibility is necessary in transport arrangements to cope with peak demands when they occur.

The tendency in the larger cities is to curtail the space available for the household stock of fuel which puts upon the supplier the onus of more frequent delivery and consequently more expensive service. In the domestic market, however, the hot water boiler provides more stable conditions than that for central heating, in which the demand is entirely seasonal. The consequence is that the producer often has to maintain a considerable outlet for his fuel in the industrial field, which is not so liable to fluctuations, and which permits of his stocks being kept within reasonable proportions.

Fortunately for the coke stocks there occurs also a corresponding diminution of gas demand, so that a section of the carbonizing plant is shut down during the summer months, and possibly more water gas is made to balance the difference between make, demand, and stocks of coke.

Chart 1 illustrates the seasonal fluctuations in coke manufactured, used on the works and that available for sale; while Chart 2 shows the seasonal fluctuations in the demand for coke for various uses. These diagrams which relate to the London area will probably be representative of the conditions throughout the country.

Central Marketing.

The possibilities of central control for marketing, price regulation, or distribution for the entire coke production of the country are from time to time raised in the Technical Press as a means of effectively placing the commodity on a sound economic basis, and of extending its sphere of use. That a certain degree of rationalization is feasible is proved by the central system which is operative in France, where competition with coke by other fuels is probably more severe than is the case in this country.

A central coke organization would have definite advantages; firstly, in stabilizing prices; and secondly, in permitting the distribution of the fuel in a more rational way. Co-ordination would not only be beneficial in meeting adequately the demands of the markets which are available, but also in creating further markets in the starved areas which have not even been examined. The balancing of fuel stocks against peak demands would also become rationalized to the advantage of both the producer and the distributive trade.

A central organization would probably have as a primary policy the popularizing of coke as well as the development of new markets. There are certainly many arguments in favour of the Industry pooling its resources and putting its product on a more stable basis than has hitherto been attempted.

The conditions of markets and the competition which coke has to meet from other fuels varies so radically in different parts of the country that it would seem necessary to institute regional associations to operate in the same way as the London and Counties Coke Association, and then to co-ordinate the work of all such bodies in one centre.

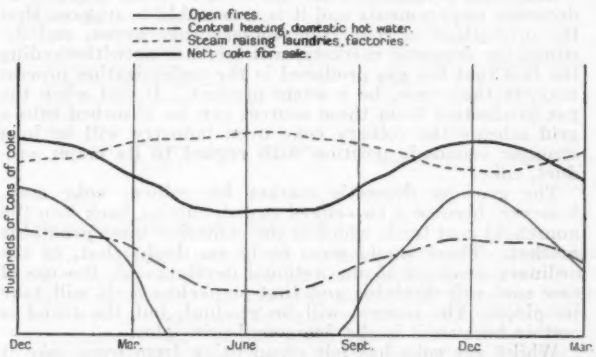


Chart 1.—*Showing the Seasonal Fluctuations in Coke Manufactured, Coke Used on the Works, and Coke Available for Sale.*

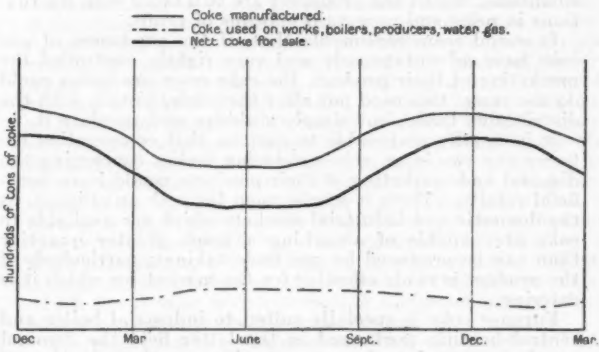


Chart 2.—*Showing the Relation between Coke Manufactured, Coke Used for Works Purposes, and Coke for Sale.*

Price Regulation and Advantages.

Price regulation has been practised in London and the home counties through the London and Counties Coke Association for several years and has shown very marked benefits to the producer and the distributor alike. It has meant an economic return to the producer and has provided a fixed and reasonable margin to the merchant. It has further maintained an assured supply at fixed rates to the consumer and the results have generally reflected the soundness of the policy pursued.

Whilst this system has been in use only in London and the surrounding home counties, experience has fully proved its utility and would justify other areas regulating their markets in the same way. It further enables the producer to know beforehand the revenue which he can expect from his product.

Stability of prices has proved very acceptable to the merchants who know exactly what their margin is to be, whereas the distributive trade outside the home counties area is groping in uncertainty and is continually stressing

the need for organization to alleviate or regulate its position.

Gas Coke and Furnace Coke.

The markets which have been developed by the gas companies in the South of England have been of considerable advantage to the manufacturers of furnace coke who are taking a greater interest in the domestic markets than they have done hitherto. In London and the home counties the quantity of furnace coke sold within that area is probably not less than 1½ million tons.

It is logical that the colliery coke oven industry should be turning its attention to the domestic market, as the tendency of the steel trade is to provide more metallurgical coke from its own ovens situated, as so obviously they ought to be, at the steel works themselves. They then have the additional advantage of using the coke oven gas for their process purposes.

Further, the production of finished steel in this country for foreign export is diminishing. Several of our large steel companies have already established works in countries overseas, so that the demand for metallurgical coke may not again reach the figures of previous boom years. The collieries are forced therefore to seek other markets for their coke.

They can produce a coke well suited to the majority of domestic requirements and it is reasonable to suppose that the production of coke from colliery coke ovens, and destined for domestic markets, will increase notwithstanding the fact that the gas produced in the carbonization process may, in their case, be a waste product. If and when the gas production from these sources can be absorbed into a grid scheme the colliery coke oven industry will be in a stronger economic position with regard to its major product, coke.

The growing domestic market for colliery coke may, however, become a two-edged sword, cutting back into the household coal trade which is the collieries' most profitable market. There would seem to be no doubt that, in the ordinary progress of our national development, the use of raw coal will diminish and that smokeless fuels will take its place. The process will be gradual, but the trend is certain because it is obeying sound principles.

Whilst gas coke has felt competition from oven coke it has not done so severely, where the selling of furnace coke is stabilized equally with gas coke, particularly in the South of England. The distributive trade in the southern area, in whose hands the disposal of furnace coke almost entirely lies, has very naturally taken advantage of these conditions, whilst the producers are still faced with fluctuations in price and uncertain margins of profit.

It would seem reasonable that, if the producers of gas coke have advantageously and very rightly controlled the marketing of their product, the coke oven producers could do the same; this need not alter their relationship with the distributive trade, but simply stabilize and regulate it.

It is equally reasonable to suppose that co-operation between the two large coke producing bodies concerning the disposal and marketing of their products would have beneficial results. There is ample room for such an alliance, as the domestic and industrial markets which are available to coke are capable of absorbing a much greater quantity than can be produced by gas undertakings; particularly if the product is made effective for the market for which it is catering.

Furnace coke is specially suited to industrial boiler and central heating work, and in the latter field the demand can be expected to increase steadily, as the adoption of central heating in this country is in its infancy. Whilst the application of central heating in this country will never be as common as in America, due in some extent to our different climatic conditions, it is probable that very great strides will be made in its development, not only for large but also for moderately sized buildings.

Quality and Demand.

It has previously been stated that improvement of coke quality has resulted in a better sale of the product, and whilst it is easy to generalize in this way, it is difficult to bring exact examples which show proof of this assertion. Sales records are kept by every gas undertaking, but they are infrequently sub-divided, so that no complete indication of the direct value of grading can be obtained. A series of figures have fortunately been secured which illustrates the increasing demand which has taken place over six years for the graded sizes, and it will be noted from Table 6 that whereas in 1928 the market demand for graded coke was only 25·75 per cent. of the total make, in 1933 it has increased to 56·55 per cent., the increment being steady and continuous year by year.

The question of quality is not only one of size, moisture and ash content, but of suitability for the appliance in which the fuel is to be used. The diversity of appliances for using coke is such as to necessitate the producer having a reasonable knowledge of their functions, so that he may within practical limits provide the best fuel for a particular apparatus.

TABLE 6.—*Relative Demand (per cent. of Total) for Large and Graded Coke.*

Year.	Large.	No. 1 Broken.	No. 2 Broken.	Total Graded.
1	2	3	4	5
				Per Cent.
1928 . . .	74·25	20·08	5·67	25·75
1929 . . .	63·79	27·22	8·99	36·21
1930 . . .	55·65	32·59	11·70	44·35
1931 . . .	55·36	27·73	16·91	44·64
1932 . . .	48·9	35·7	15·4	51·10
1933 . . .	43·45	38·55	18·0	56·55

The user of coke has generally little or no knowledge of the right fuel which ought to be used in his appliance, and consequently he frequently orders and employs the wrong size with disappointing results. It should be the duty of the fuel supplier, whether merchant or producer, to know the appliance which is using his fuel and to be able to define the best grade for his customer's satisfaction.

This emphasizes the necessity for the adoption of a standard nomenclature, stressed elsewhere in this Paper, so that the customer may order the grade of coke he requires, and may be sure of receiving it.

The various coke markets which can be catered for by a gas undertaking are to a certain degree circumscribed by the particular conditions of the Works, and its area of service. It is conceivable that an undertaking may dispose of all its coke make solely in the domestic market, without the necessity for sales in non-seasonal markets.

UTILIZATION OF COKE.

Central Heating.

The development of coke-burning plant for central heating work has been considerable within the last three years. Previously the central heating market was being rapidly secured by oil fuel because of the convenience which this fuel offered, and this trade, which had been a good one for coke, was dwindling as a consequence.

Whilst it could still be shown that coke in the hand-fired cast iron sectional boiler was generally cheaper from the point of view of heat production, the plant could not be considered convenient, was not clean in operation, and had not the automatic characteristics possessed by an oil system; it required frequent attendance and generally was considered out of date. Oil fuel systems had none of these disabilities but a higher cost, and as it appealed to the trend for modernism, architects legislating for new heating systems were prone to consider only oil.

In 1931 a notable advance was made by the introduction of the Gravity Feed boiler, coke-fired, which could claim almost all the conveniences of the oil fuel system, and had considerable additional advantages. This boiler is at the present day firmly established, particularly in the London area, and is to a marked degree displacing oil fuel systems which were in project or had already been installed. It is being accepted by architects and the heating trade for installation in the most modern buildings, and fulfils with solid fuel exacting conditions of automaticity.

The tax on imported fuel oil imposed by the Budget of 1932 was an additional factor which considerably influenced the recovery of the central heating field for coke.

The Gravity Feed boiler consists essentially of a magazine, to contain the fuel, built as an integral part of the boiler. The quantity of coke which can be so stored will depend upon the height to which the magazines or hoppers may be constructed. Normally the units are provided with fuel capacities sufficient to enable them to operate for periods of 12, 18, and 24 hours at maximum output without attention or refuelling. The fuel is fed on to the grate of the boiler solely by gravity, and by the wastage of the fuel on the grate, so that in effect the fuel feed is as uniform as, and consequent upon, the burning function.

A great asset in this boiler is its freedom from any moving and/or power driven parts, inside or exposed to the heat of the fire. It can therefore be relied upon for continuity of operation with immunity from breakdown. It can claim a considerable advance over all mechanically stoked systems because of this feature; further, the efficiency of the system is continuously high because combustion conditions can be maintained with stability under varying load conditions by automatic control.

The attendance required on a Gravity Feed boiler of this type is only that necessary for removing the ashes and for

TABLE 7.—*Efficiency Tests on Magazine Fed Coke Boiler.*

Duration in Hours.	Comb. Rate, Lbs. Sq. Ft. per Hour.	Output, B.Th.U. per Hour.	Thermal Efficiency.	Flue Loss, Per Cent.	Radn. and Convection Loss, Per Cent.	Losses Not Accounted For, Per Cent.	Clinker Stated in. Lbs.	Clinker Per Cent. of Coke.	Clinker Per Cent. of Ash.
1	2	3	4	5	6	7	8	9	10
48·2	1·69	450,560	76·7	23·3 by difference	..	..	12	0·55	7·7
49·0	2·24	610,440	78·7	16·3	2·3	2·7	63	2·3	30·4

Grate Area, 26 sq. ft.; Draught over fuel bed; Dampers open 0·14 in. W.G.; Dampers closed 0·01 in. W.G.
Average output 155,500 B.Th.U. per hour during 12 hours shut down.
De-ashing carried out on alternate days.
Clinkering once per day.

re-charging the magazines, at either 12, 18 or 24 hourly intervals. The time taken by such attendance need not exceed 20 minutes for a boiler of one million B.Th.U. capacity. Where this type of boiler is installed it is frequently the practice to lock up the boiler house and for the attendant to visit the plant only once in every 24 hours.

The automatic control system is essentially simple and consists primarily of a thermostat and/or variostat which in turn controls a small fractional H.P. motor with which the dampers are connected by suitable gear. A safety device is provided so that if the electric current fails, the boiler dampers are closed to a safe position until the supply is resumed, when the system automatically takes up operation again without any manual aid.

Special attention has been given to producing these units with a high-class finish so that the modern coke-fired boiler house can be claimed to be a better looking installation than an oil fuel system, and apart from the daily removal of ash, there would be no evidence of any solid fuel being used; further, it is absolutely silent in operation.

Gravity feed boilers are now being produced in both steel and cast iron sectional design, and in comparatively small sizes. The cost, particularly of the cast iron units, compares favourably even with the older type of cast iron sectional boilers.

Installations of these boilers have been in operation for a sufficiently long period to prove their value and already repeat orders have been received by the makers.

The cost of heating with a Gravity Feed coke-fired boiler is almost half that required by an oil fuel system of equivalent capacity at the prices of fuel now ruling (March, 1935). The benefits of this appliance to the Gas Industry are represented not only by the ultimate recovery of the central heating market for coke, but by the probability of users remaining on coke, as other fuels would not operate as satisfactorily or with equal safety.

Considerable development has also taken place in the fitting of automatic control, even to comparatively small heating systems where ordinary boilers are employed. The benefits accruing from such an addition are a direct saving in fuel of about 18 per cent., and a more equal temperature for heating, with less attendance.

Gravity Feed Boiler Tests.

The efficiencies of modern coke-fired gravity feed boilers have been increased to a degree even beyond that obtainable with oil fuel systems. Further, the flexibility of a plant of this character is considerably beyond the range of the old type boilers. A test on a Gravity Feed boiler of one million B.Th.U. capacity per hour is given in Table 7.

It will be noted from the figures of Table 7 that, whilst the boiler capacity was one million B.Th.U. per hour, the heating load could only be provided in the first case at less than half the rated output, and in the second test at only 61 per cent. of output. The efficiency was, nevertheless, exceedingly good even under these circumstances, which were not conducive to showing the best results. By comparison with these, the efficiencies obtained in a normal sectional type of boiler not having the same grate design would have been in the region of 50 per cent. The flexibility of the unit is shown by the fact that, during the time the boiler was banked down, the output was reduced to the rate of 155,500 B.Th.U., less than 16 per cent. of the rated capacity.

The actual ground space occupied by the boiler is less than that which would be required for the same duty for an ordinary sectional boiler of the older type, the height question being one of fuel capacity rather than of boiler size.

Comparative Cost of Heating.

The comparative cost of heating from a plant of the gravity feed type using coke as a fuel, as opposed to an electrical thermal storage system used in the same building, is given in Table 8.

TABLE 8.—*Comparison of Coke and Electrical Heating Plants.*

—	Coke.	Electricity.
1	2	3
Maximum hourly output in B.Th.U. per hour	1,500,000	6,000,000
Space occupied by plant in cu.ft.	4,000	32,600
Annual running costs for a daily heat output of 25,000,000 B.Th.U.—		
Fuel consumption	186 tons	1,236,000 units
Coke at 32s. 2d. per ton	£309	..
Electricity at 0·25d. per unit	..	£1,287
Ratio	1	4·16
Fuel costs—		
(*a*) per therm (*i.e.*, 100,000 B.Th.U.).	1·8d.	7·5d.

Domestic Hot Water Boilers.

The continued popularity of the coke-fired domestic hot water boiler is evidenced by the annual increment of installations made. In 1934 the number of domestic boilers sold was as nearly as can be ascertained, 155,000, and it is anticipated from building programmes which are in execution and project, that the increment for 1935 will reach the 200,000 figure, of which probably 60 per cent. refer to the southern part of England. Even small property is to-day being fitted with the domestic boiler, which, coke-fired, is undoubtedly the cheapest means of obtaining the household hot water service.

A recent census made by the London and Counties Coke Association shows that there are 192 different named domestic boilers on the market and that there are approximately 40 regular manufacturers of this class of boiler, many of which produce a series of types and sizes. A number of domestic boilers are, however, now being assembled and marketed by small jobbers, builders' merchants, &c., who have been attracted into the field by the demands of speculative builders, and the mass erection of houses on building estates. This development which has taken place outside the regular boiler trade has had a damaging effect on the general suitability of the boilers for the service for which they are destined. It has, as a natural sequence, engendered a price-cutting race, and has influenced the production of cheaper and still cheaper units which the regular maker is finding uneconomic to produce unless he condones shoddy manufacture.

The result has been unfortunate from all aspects and has created a considerable amount of trouble for the fuel producers, as it is they who receive the brunt of dissatisfied customers' complaints. The supplier of the boiler and probably the builder of the property is usually well out of the picture by the time the client puts his boiler to work. Both the regular manufacturers of domestic boilers and the suppliers of fuel have become acutely aware of this serious development and are anxious that it should be suppressed.

The threat to the coke industry by continuance of such exploitation is a very real one, as it must, unless checked, ultimately damage a profitable and expanding market to boiler manufacturer and fuel producer alike. The London and Counties Coke Association have, in conjunction with the makers, actively taken up the matter and it is hoped that their efforts will be effective.

Competition to our coke markets comes in many guises of which we must be cognizant. Without a Coke Organization such matters would drift almost unopposed into obstacles threatening the well-being and expansion of our markets. The London and Counties Coke Association has, fortunately for the Industry, acted in such matters not only for the interest of its own members, but for the good of the Industry as a whole, a fact which the Gas Industry

has not generally appreciated. If a *national* organization could act in these matters how much more effective it would be.

If we take the low average coke consumption of the small domestic hot water boiler at 3 tons per annum, the increment of boilers represents something over 300,000 tons of coke in the home counties area alone.

Of all domestic boilers marketed more than 85 per cent. of them operate on coke fuel, which is an indication that graded coke is admirably suited for this appliance. The initiation of the modern domestic boiler must be acknowledged to the credit of the original London Coke Committee, whose far-sighted policy has been largely instrumental in establishing what has now become one of the most lucrative markets for coke. The London and Counties Coke Association have continued and sustained their connection and interest in domestic boiler development, and expert technicians are employed by them to keep in touch with manufacturers in every direction which may lead towards the improvement of the appliance and its actual operation in the client's home.

Convenience, economy, and efficiency in operation are being studied and if the better-class boilers of adequate size and design are given their just and deserving position, then the future domestic boiler market is secure.

Design and Types.

The tendency of new design is towards automaticity, a reduction in labour, cleanliness in operation and symmetry of appearance. The domestic boiler was early in the field with attractive enamel finishes, and the individual's taste in regard to colour combination is now catered for in the same way as has been done with gas cookers.

Attention in new design is being particularly concentrated on obtaining longer periods of operation without attention, and with higher efficiencies. It is thought that the day is not far distant when the domestic boiler will function for 24 hours without attention, and even the smallest units can now be fitted with some degree of combustion control without excessive cost. Grate bar design is receiving attention, so that the fire shall be as far as possible self-cleaning; in other words, the poking, raking, and withdrawal of clinker in the old way is to be eliminated. The only manual operation required for cleaning the fire will be by the simple means of depressing a lever. There will be no external dust or inconvenience caused as with the older boiler types.

Specification for Minimum Size Boilers.

The necessity for some standardization of domestic boilers both of rating and fuel capacity has long been recognized, and the matter has recently been actively taken up by the Technical Committee of the London and Counties Coke Association in conjunction with representatives of the boiler makers.

It was thought that, if agreement could be reached on the minimum size of domestic boiler, a very substantial advance would have been made towards curtailing the production of the shoddy and excessively small boiler. A specification has been framed and, although not yet accepted as a general standard throughout the trade, is being worked to by several makers.

The specification is being used by the London and Counties Coke Association and no boilers are placed on their list of approved appliances unless they meet its requirements. It would strengthen the future domestic coke market if gas undertakings throughout the country would take advantage of the work which has been done, and is continually being undertaken by the Technical Committee of the London and Counties Coke Association on domestic boilers; their list of approved appliances could with advantage be adopted throughout the Industry and would ensure that no boiler is installed below a standard calculated to give satisfaction to the user and fuel producer equally.

Domestic Boiler Efficiency Tests.

The efficiency of high temperature coke, low temperature coke and semi-anthracite coal in domestic boilers is compared in a series of tests given in Table 9 which indicate that high temperature coke is more efficient than fuels of higher volatile content, which is to be expected as the longer flame would give a higher flue exit temperature.

Open Coke Fires.

The growing popularity of the open coke fire was to some degree alarming the Gas Industry because it was thought that it represented a possible danger to the installation of gas fires. Under such circumstances there was perhaps a natural hesitancy to sponsor it and to exploit the possibilities of this coke market.

To examine the situation thoroughly a census was taken in the Greater London area during 1933, when it was found that from all sources 69,029 open coke fires had been sold. Of this quantity 16 per cent. could be traced directly and indirectly to the replacement of gas fires, and as it will be understood that this census was from the point of view of gas sales, every doubtful case was put to the side of gas displacement.

Table 9.—*The Effect of Type of Fuel and Rate of Combustion on Efficiency.*

—	Tests on Small Domestic Boiler.—Proximate Analysis of Fuels.				
	Moisture, Per Cent.	Volatile Matter, Therms/Ton.	Ash, Per Cent.	Rate of Fuel Combustion, Lb./Hour.	Efficiency, Per Cent.
1	2	3	4	5	6
High temperature coke . .	3·7	2·2	9·30	1·2	71
				1·77	68
				3·39	60
				4·27	57
Low temperature coke . .	3·1	13·76	3·1	1·72	61
				2·14	57
				2·19	56
				4·29	53
				4·56	51
Semi-anthracite Scottish coal	0·4	11·71	6·55	1·61	53
				1·94	56
				4·08	54

Accepting these figures and assuming that the coke fires were gas ignited, the gain in gas load more than compensated for the loss of the gas fires—direct evidence that the open coke fire is not a competitor but a distinct asset to the gas side of the Industry. Further scrutinies have been made by various companies of their increments in coke fire sales, and the displacements which have taken place for gas fires, and the results from these sources all go to prove that the initial figure of gas displacements was excessive and that the displacement ratio is actually not more than 6 per cent. It is also reasonable to suppose that a proportion of the gas fires replaced would be in any event removed, in which case the Gas Industry would probably lose the business entirely; whereas if a coke fire does replace a gas fire, it still remains a beneficial installation inasmuch as it consumes gas and coke. On the other hand, a change over from gas to coal or to electricity means a complete loss.

The open coke fire presents one of the best possible markets for gas coke, and it can be exploited to considerably greater advantage than has generally been the case heretofore. The trend of public opinion is towards the use of smokeless fuels and the various societies which have smoke abatement as a part of their policy are extending their efforts towards public education in this respect.

The open fireplace in the British home will remain an institution probably for many decades to come, and this market consumes 40 million tons of raw coal per annum.

The evidence in the London area where the greatest development has taken place in the use of the open coke fire shows that the poorer type of household is the one adopting the change in large numbers, and this is not so much because of the smokeless characteristics of the fuel, but because of its undoubted economy.

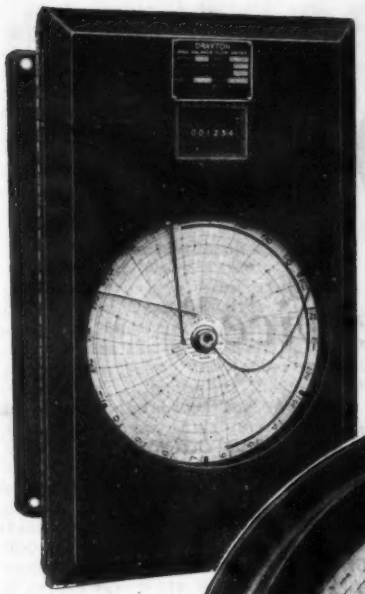
Considerable controversy has taken place as to whether it is necessary for the Gas Industry to provide a coke which is suitable for use in any existing grates, or whether the coke which the Industry has now available shall be sold through the medium of a new grate installed. It is evident that coke so far produced by the Gas Industry by high temperature carbonization is not sufficiently reactive to serve as an all-purpose open grate fuel. If, however, a suitable grate is provided, then high temperature coke as now marketed by gas undertakings is eminently suited for this service, proof of which is the popularity which the coke grate has already achieved.

The possibility of the Gas Industry providing a coke in any quantity by low temperature carbonization suitable for all open fire purposes is probably remote. At the same time it is evident that low temperature coke can find a ready market for open fires, as is proved by the sale which it now obtains even at considerably higher prices than gas coke. It is also obvious that the Gas Industry could not nearly supply the demand for coke which might be created from this source, that is, if coke is to be continued as a by-product. Taking the position as it exists at the present day, it would seem an obvious and sound policy to pursue the installation of the special grates for coke fires, which after all represents the greatest economy to the user.

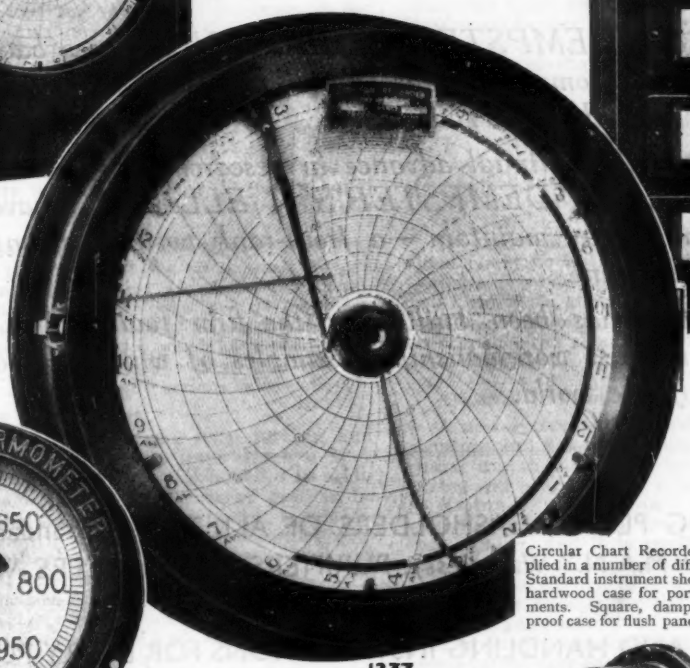
Open Coke Fire Economies.

The capital outlay involved in purchasing a new coke grate is on an average about £3; coke fuel can then be purchased at around 40s. per ton. With low temperature coke

Drayton
GAS WORKS EQUIPMENT

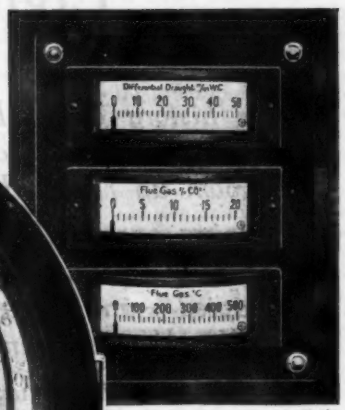


The Ring Balance Type Flow Meters and Flow Regulators for steam, water, air, gas, and other fluids, can be supplied with circular charts, giving one complete record in 12 or 24 hours, or with tape chart giving continuous record of guaranteed accuracy.



1237

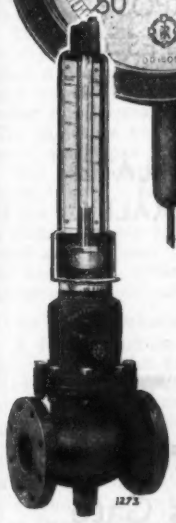
Circular Chart Recorders are supplied in a number of different cases. Standard instrument shown. Light hardwood case for portable instruments. Square, damp and fume proof case for flush panel mounting.



794A

Any number of the edgewise instruments shown can be mounted on a panel giving a comprehensive indication of temperature, draught, vacuum, etc.

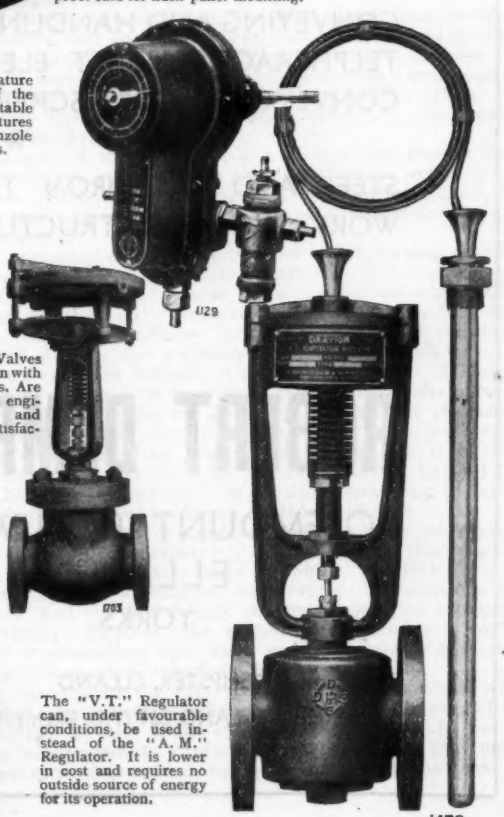
Drayton Dial Thermometers are first-class instruments. They have clean open scales and are individually calibrated and tested. Made in various sizes for temperatures up to 1000° Fahr.



1273

The vertical scale Flow Indicator shows the quantity of fluid flowing in a pipe-line. Useful where an expensive meter is not warranted. For translucent fluids only. Other types available for opaque fluids.

Other Drayton equipment of interest to Gas Works Engineers includes Steam Traps, Draught Gauges, Retort House Governors, Liquid Level Gauges, etc. May we send you the appropriate section of our catalogue?



1129

1103

Automatic Control Valves for use in conjunction with relay type regulators. Are designed on sound engineering principles and give continuous satisfactory service.

The "V.T." Regulator can, under favourable conditions, be used instead of the "A.M." Regulator. It is lower in cost and requires no outside source of energy for its operation.

1479

The DRAYTON REGULATOR & INSTRUMENT CO., LTD.,
WEST DRAYTON MIDDLESEX

1855-1935

"Eighty years of service"

The history of "DEMPSTER'S of ELLAND" goes back to the very early days of commercial gas plant. In actual fact, the firm has "grown up" with the Gas Industry.

Keeping pace with continual advance in research, design and manufacturing methods, "DEMPSTER'S of ELLAND" have always occupied—and to-day maintain—a front-rank position among makers of Gas Works Plant.

Their reputation has been built upon the firm foundations of sound design and first-class workmanship; examples of which are to be seen in all parts of the world.

CARBONISING PLANT, GASHOLDERS OF ALL TYPES (Standard-guided, Spiral-guided, "M.A.N." Waterless); PURIFIERS, CONDENSERS, WASHERS, TAR EXTRACTORS.

CONVEYING AND HANDLING INSTALLATIONS FOR EVERY PURPOSE—TELPHERAGE, BUCKET ELEVATORS, SKIP HOISTS; ALL TYPES OF CONVEYORS; COKE SCREENING AND GRADING PLANTS; CRANES, WAGON TIPPERS.

STEEL AND CAST IRON TANKS, RIVETED AND WELDED PLATE-WORK—BUNKERS, STRUCTURAL STEEL AND IRON WORK GENERALLY.

ROBERT DEMPSTER & SONS LTD.

ROSEMOUNT IRON WORKS
ELLAND
YORKS

Telegrams: DEMPSTER, ELLAND
Telephone: ELLAND 261 (P.B. Exch.)

16 Queen Anne's Gate
LONDON
S.W.1

Telegrams: ELLANDORS, PARL, LONDON
Telephone: VICTORIA 3661

a new grate may not be essential, but, at present day prices in London, 58s. per ton must be paid for the fuel; alternatively good quality household coal at 50s. per ton, anthracite for stove purposes at about 70s., or cobbles and beans at about 61s. per ton might be used. In 14 lb. bags low temperature fuel is retailed at the rate of £4 per ton.

These comparisons indicate the reason for the popularity of the open coke fire in the poorer districts and illustrate that high temperature coke is better value for money than low temperature coke, and lasts longer. Investment in a new grate is one which is very well worth while. The user is the final arbiter in these matters and if he could be shown the case in its true perspective, there would seem to be no further necessity for the Gas Industry to hesitate or to spend its time searching for an ideal fuel, but to take advantage of that which already lies to its hand.

A gas coke fire is a wonderfully successful method of heating a room economically; the public have satisfied themselves on this point, yet the Gas Industry hesitates because it means the installation of a new grate. We want new grates because we need every grate to be gas ignited, and it must be realized that there are many grates which are not even satisfactory for raw coal. Evidence shows that where an undertaking has taken up the sales of open coke fires the response has been immediate. In the London area the increment in five years is 1,200 per cent. and for the rest of the country 700 per cent.; these figures do not include the recent enterprise of the Oldham Corporation, for which estates in Oldham and Royton are to be installed with 800 and 1,500 open coke grates, respectively.

It would seem, therefore, sound to sponsor the installation of grates which are suitable for high temperature coke, and which at the same time provide a very acceptable gas load.

It is no confession of weakness to admit that coke fires require gas to ignite them; in fact the trend must always be towards convenience and labour saving in the home, and gas ignition of any fire, coal or coke, is a development in this direction. There is no doubt of the satisfaction of users with the gas coke grate. Sales which have been made are consequent upon recommendations from one user to another, rather than upon any really serious sales policy.

Open Coke Fire with Back Boiler.

The open coke fire has been carried a stage further, and is now provided with a back boiler, from which a very effective domestic hot water service is obtained. In addition a combination gas and coke fire, whereby gas can be used for occasional heating when the main fire is not required, is on the market. Such developments, which provide for a gas load other than that of the standard gas ignition device, should be encouraged.

It should be emphasized that whilst the coke grate is designed for the effective combustion of gas coke, it is suitable for use with any other solid fuel, probably more so than many normal grates of the so-called modern type.

The grade of gas coke normally used for open fires is 1 in. to 2 in. cut coke, and having a moisture content not less than 3 per cent., as below this figure the fuel is too dusty and causes complaint. A high moisture content on the other hand causes delayed ignition and reduced radiation. The moisture range for satisfactory use lies between 3 per cent. and 6 per cent.

The ash content should be as low as possible and free from " bats " or shale which cause " fliers; " the volume of the ash has a bigger effect on radiation than its weight, a factor largely related to the inherent ash in the original coal and beyond practical control in the coke. The ash by weight is, within limits, controllable, and for open fire purposes should not exceed 8 per cent.

Coke as a Complementary Fuel to Gas.

A further phase of coke sales which has not been appreciated to the extent it might have been, is the possibility of using coke in a much greater degree as a definite aid towards the employment of gas. A case in point which very aptly illustrates the practical assistance which coke can give, is that of the water heating load for the small domestic household. In most cases the cost for a completely gas heated water service would be prohibitive to the tenant, and whilst the water heating load for the average dwelling would be of great value to the gas side of the Industry, it seems difficult to reach unless some means may be employed of reducing the cost.

It is conceivable that coke may be a factor whereby a substantial part of this load may become accessible. The scheme would be to install a hot water back boiler fitted to the ordinary coke fireplace and to use a gas system as a topping up installation. In almost every small household the open fireplace is in the living room, and is used for at least five months of the year, with an average daily operation of about seven hours; during the whole time this fireplace is operative, the hot water production would be from that source. If the hot water storage cylinder is adequately lagged the sustenance of heat would require little gas after the fire had ceased functioning to maintain the water at a high temperature ready for the next morning's demand. In effect, it would mean that 40 per cent. of the hot water service in the household would be provided from the coke fireplace and that the remainder would be supplied by the gas heater.

The cost of providing hot water from the coke fire is not generally considered separately by the householder, who feels that he has to warm the room in any event and that the heating obtained for his water service is more or less free.

The cost of installing a combination system is not much greater than for an ordinary standard equipment, and the tenant thereafter has the gas service at his disposal. Whether he uses it to a greater or a lesser degree is a matter for his judgment relative to the sum he is prepared to spend on his hot water supply.

A coke and gas combination water heater does not present difficulties from the point of view of installation or operation, and the reason for its not having had more general application is probably the fact that the gas salesman has dealt with gas appliances only, and has not been interested beyond that. On the other hand, the coke salesman gets in his appliance and his duty is finished. Co-ordination of the two is all that seems to be needed to institute a complementary use of the two fuels with advantage to both.

In the same way a gas circulator for summer use could be employed quite effectively in conjunction with the coke domestic boiler. There are many households where the boiler could be almost completely closed down during the hotter summer months if other means of water heating were available.

If even a small proportion of the summer water heating load could be obtained for gas, it would be of immense value and would not be felt to any important extent by the coke side. In the more conservative north, particularly, the combination of the open coke fire boiler with a gas heater in series should appeal, for it represents convenience with economy.

" All-in " Heating Contracts.

A new system of coke sales with service for the central heating and hot water supply of large buildings, blocks of flats, &c., has recently been inaugurated in the London area, and is apparently receiving favour.

Known as the " all-in " contract, this system provides for the supply of fuel, the removal of ashes, and the labour for stoking, and it is tendered for in one lump sum. In other words, it is a means of selling heat in a form attractive to clients who would know beforehand exactly what their heating for the year is to cost, irrespective of weather vagaries.

The supply company, on the other hand, has complete jurisdiction over the boiler plant, fuel quantity and quality, and the periods of stoking. They are required, under the terms of such contract, to maintain a specified temperature —how they do that is, within reason, their affair, but obviously the higher the operating efficiency, the greater will be the saving in fuel.

Contracts of this type will also ensure that during their tenure clients are secure to the use of coke, and a series of such contracts would provide a very useful market for the supplier, permitting reasonable elasticity in service and fuel delivery.

The incidence of the Gravity Feed boiler making possible long periods of automatically controlled operation without any attention has, of course, been largely instrumental in making an " all-in " contract attractive to the fuel supplier. With the ordinary heating boiler plant requiring frequent stoking, the question of attendance tends to make a service contract difficult, if not impracticable. When an attendant is required to visit a plant more than once or twice during 24 hours the labour charge may be excessive, particularly if the plant is distant from headquarters, in which case travelling time may become greater than operating time. There is no reason, however, beyond the probable high labour cost, to preclude any type of boiler plant being serviced under an " all-in " charge.

Whilst this form of contract may initially only seem practicable in comparatively large towns, there is no reason why institutions, large buildings, hospitals, &c., in country districts should not be serviced, if conditions are suitable, and the fuel supply company equipped to undertake them. Further, the system does provide a useful means of promoting coke sales and maintaining a reasonably secure market, free from petty complaints.

One can regard the future of gas coke as a whole with optimism; given more confidence and a wider vision of its possibilities by the Industry there would seem to be no reason to prevent its exploitation to a greater and more remunerative degree than has been the case in the past.

Wales and Monmouthshire Association of Gas Engineers and Managers

Under the glorious weather conditions which have almost invariably favoured them, the Association assembled in Llanelly on Thursday, May 23, for their Thirtieth Annual Meeting.

The President.

The reason for selecting Llanelly for the meeting was that the President for the year is Mr. Harold Barker, who is Engineer, Manager, and Secretary to the Llanelly Gaslight Company. Mr. Barker began his association with the Gas Industry as pupil to Mr. W. S. Haddock, of Warrington. Subsequently he was appointed Assistant to Mr. Haddock, and during this time he assisted Mr. James Paterson, of Warrington, and Mr. Thomas Newbigging in the testing of coals. In 1894 Mr. Barker became Manager at Pontypridd, and during the six years he occupied this position he started up the Pontypridd Council's new works at Treforest. Mr. Barker's next move was in 1900 to Buxton, where he was appointed Gas Engineer in succession to Mr. George Smedley. He remained at Buxton for eleven years, during which period extensive alterations were made in the works, the capacity of which was substantially increased. Since 1911 Mr. Barker has been at Llanelly, where he went on the resignation of Mr. Thomas Acland.

Mr. Acland himself was President of the Association in 1908, when the members held their meeting in Llanelly. There were some present last week who also attended the meeting in the town twenty-seven years ago.

Business Proceedings.

On this occasion the business proceedings took place in the Royal Engineers' Hall, Murray Street, where the Mayor attended and extended a hearty welcome to the members. He drew attention, with great satisfaction, to the fact that evident good feeling prevails between employers and employees in Llanelly.

A cordial welcome was extended to Mr. ARTHUR ROBERTS, of Hereford, the President of the Midland Association, who expressed his pleasure at being with them that day.

The HON. SECRETARY (Mr. Octavius Thomas) having read the minutes of the last meeting, the following additions were made to the roll of the Association, on the proposition of Mr. H. SUTCLIFFE, seconded by Mr. H. G. HORWOOD.

New Members.

William Arthur Pask, Caldicot, near Chepstow.
Kenneth Edward Tiddy, Carmarthen.
Alfred William Willett, Builth Wells.

Associates.

David Bourdice, Cardiff.
Peter Blair, Altrincham.
Maurice Thornton.

Annual Report.

The HON. SECRETARY next submitted the thirtieth annual report, which showed that during the year five members and eight associates joined the Association. With adjustments for deaths and resignations, and one transfer, the roll at the end of the year was 75 members, 4 honorary members, 4 students, and 52 associates. The receipts for the year to April 30 amounted to £127 8s. 6d., and interest on Consols to £1 18s. 8d. Adding £28 14s. 10d. brought in made a total of £158 2s. The expenditure was £124 2s. 11d., leaving the sum of £33 19s. 1d. in the hands of the Treasurer, with £100 of 2½% Consols.

The Council expressed their great appreciation of the work on the industrial use of gas carried out by the Cardiff Gas Company, and voiced their hope that more undertakings would join the scheme.

The report and accounts were unanimously adopted on the proposition of Mr. E. ABLETT, seconded by Mr. A. E. PASK.

Presidential Address of Harold Barker, Llanelly

There is no one in this room to-day who does not realize that the Gas Industry is passing through very severe and critical times. We are faced with exceptional competition, I say exceptional because it is from an Industry that has the advantage of being comparatively new, of being the "baby" that varied sections of the community help to "feed," of having Government support and publicity given to it by Members of Parliament and others in high authority, of guaranteed financial backing, and whose advocates appear to ignore the part that gas has played in the past, the part we are now playing, and, I say with every confidence, the part we shall play in the future. Blind eyes are turned to the old saying "Robbing Peter to pay Paul." Thus we read from time to time paragraphs appearing in the Press reporting speeches such as recently occurred when the following phrase was quoted: "Electricity is the future fuel, and gas, steam, and oil are to be things of the past." This biassed expression coming from a town councillor—happily not a Llanelly Town Councillor—unless it is shown to be false will tend to induce apathy in the minds of ratepayers and gas consumers. Such expressions only display deplorable ignorance. The public should remember that the Gas Industry directly employs many thousands, while there is no doubt that thousands more depend upon the use of our commodity in their daily occupations. Misleading statements should be taken up and contradicted at every opportunity. Electricity is a good though at times an erratic servant to the community, but our recognition of its advantages must not blind us to the value of our own commodity. The error many people fall into is that they regard electricity as being absolutely dependable, but experience serves to show that it is not so, both in works and private service, while the long continued, steady, and economical service given by us is often ignored.

Importance of the Gas Industry.

One wonders sometimes whether we ourselves fully realize what an important industry the Gas Industry is, and what an important part we play in the everyday affairs of mankind. A suggestion I wish to make is that our salesmen should be ready, eager, and able at all times to press home to all consumers with whom they come in contact the importance of our commodity. In passing, the term "Salesman" is often misused. To my mind all employees of an undertaking should consider themselves salesmen and never lose an opportunity of pressing home facts and presenting the advantages of gas to all with whom they come in contact.

There is one general problem affecting the whole community which I believe will be a very important factor in the near future—viz., the smoke abatement problem. Without going into details it must be obvious to us that the achievement of a smokeless atmosphere means better health for all and a big help to our Industry.

Here we have one of the real services we can offer to the public and an ideal worthy of our attention, and, what is more, one quite feasible and practical. As an industry

we should make all possible endeavours to bring home to the public the importance of this problem and emphatically state that we can, as an Industry, cope with it. All who are connected with our Industry, no matter in what capacity, should be full of enthusiasm about this question, and I hope to see the day when those at the head of affairs in this country will bring about its achievement.

Now as to gas sales. I am not going to suggest that there is any hard and fast rule by which any undertaking can increase its output. In Llanelly we are endeavouring to increase output and at the same time improve our Service by personal contact with our consumers wherever possible, and our Motto is " Service with Efficiency."

Consumption per Consumer.

You will all doubtless note from the Board of Trade Returns that the consumptions of gas per meter are decreasing. This at first glance is somewhat disconcerting, but we should not let it alarm us unduly. We must bear in mind that, though we may have lost a portion of our load, in particular the lighting load, to our competitors, it does not necessarily follow that the decrease per meter is entirely due to the advent of electricity or in particular to the intense publicity efforts with which we are confronted. We can undoubtedly account for a large percentage to the following factors:

(*a*) Our appliances to-day have reached a very high state of efficiency.
(*b*) Our maintenance schemes have tended to reduce wastage of gas on consumers' premises.
(*c*) Our improved system of following up and attention to complaints.
(*d*) Our improved average quality of gas.

All these efficiency factors have individually and collectively tended to account for this stated reduction. Personally, I have not gone minutely into the question myself, but I have read with interest that some engineers put the decrease in consumption where a new high-class cooker has been installed in lieu of one of the old type (often unpacked) as high as 14%, and though this perhaps may be considered on the high side still it really shows in effect that with a better service per unit being given to our consumers a reduction in their gas bills naturally follows. I believe that in spite of this we have admirably held our own during the past few years and there appears to be no reason, given fair play, why we should not only continue to do so in the future but should further increase our individual outputs. We must, however, take advantage of the new ideas that are gradually creeping into the business world, new methods of salesmanship, publicity, advertising, &c.—in fact, everything that tends to offer us " the means to an end."

Greater Freedom.

Much has been said in recent years of the difficulty we experience in our inability to offer advantageous terms to large users of gas. Well, we should now be in a position to consider any proposition for large consumptions. The power granted under the recent Act of Parliament, though falling far short of what we really desired and certainly deserved, has nevertheless given us more opportunities in this direction. It is to be hoped that all undertakings will be prepared to go out for the industrial load and retain it by submitting such terms as will meet the requirements of our heavy industries or of large users of gas, providing always that an equitable margin of profit is forthcoming. In the industrial field the use of town gas for industrial processes, by reason of the constant maintenance of temperature and the wonderful accuracy of heat regulation, frequently leads to a higher and more uniform quality of the finished product with a lower percentage of rejects and a greater certainty of output, and, incidentally, often increases the output per machine per hour. In many cases gas has certainly enabled the manufacturer to reach a much higher efficiency in his processes than can be obtained from solid fuel, and undoubtedly in cases of intermittent working there is a wonderful field in which gas can beat all comers.

We must realize that we are in charge of gas companies where the outlook as to service has altogether changed. No longer are we purely and simply lighting engineers and sellers of coke and tar. We have entered into an era the fringe of which has been barely touched. Indeed, it would almost seem that there is justification for a slight alteration in our title. Should we not, to-day, style ourselves Gas Light and Incandescent Heat Companies rather than Gas Light and Coke Companies? Do we not need some additional name to enable the public to realize that gas supply, though over a 100 years old, is only in its infancy and not a back number? Continued contact with the public shows how surprising is the number of people who have yet to see the great advantages that can be derived from the use of our commodity and the residuals which we produce. In this respect are we not ourselves in a great measure to blame? Have we not in the past been rather lackadaisical in our efforts to educate the public? If we are to prosper and advance we must realize that the public has to be educated theoretically and practically to appreciate the thousand-and-one uses which installations of gas appliances are scientifically and economically dealing with. The average housewife to-day admits she could not do without her gas cooker. Why do we not hear similar remarks passed about her washing machine, her wash boiler, her gas-heated circulator, her gas fires, gas iron, &c., each of which in its own sphere is equally important and labour saving as her cooker. I state definitely that we must accelerate our present efforts and further demonstrate the usefulness of such appliances on every possible occasion.

Functions of the Distribution Department.

A few further words on this very important side of our Industry. There was a time when the Distribution Department was considered efficient if it merely ensured delivery of gas to the consumer. We know, to-day, that the function of the Distributing Department does not end there. Guiding and instructing the consumer in the economic usage of our commodity are also essential. We must realize that the principle of instructing and guiding is commercially sound and can be accepted as the first principle in modern sales science. The ultimate aim of any sale must be the creation of a contented consumer. Contented consumers have helped to build up our Industry in the past and we shall have to look to them as our mainstay in the future. This domestic load must not be ignored in the endeavours we are bound to make to give bulk supplies of gas to large consumers. We may be sure that our competitors will do all that lies in their power to make the public electricity minded.

The installation of electricity for lighting is only the " thin edge of the wedge; " it needs but a very small margin to " complete electrification." We must remember that the public look upon it as a new toy, and comparative costs and efficiencies are often not taken into consideration. People will often pay more for something that is new while the old service which has served them so well in the past, and can do so equally and better in the future, is completely ignored. We were told that the advent of the wireless trade spelt ruin to the gramophone business, while in reality the sales of gramophone records and machines have increased. Again, is it not a remarkable fact that while the motor industry has pushed its sales to such an extent that the increase in motor traffic is becoming alarming, yet we read that the number of people who indulge in " hiking " is daily increasing. The comparison is obvious. The advent of electricity should only make us fully conscious that competition is good for all, and should spur us to greater efforts. All we ask is that the competition should be fair and that equal conditions should hold good for both public services.

A bold policy is needed for the future, and the question of costs must be faced. In the first place we have to see that our cost into holder is such that we can give advantageous terms to large users of gas for industrial purposes, and as coal is our raw material no effort should be spared in securing the same at the rock bottom prices at which other industries are able to buy. Again, though we have in the past had assistance from the manufacturers of gas appliances, who have given us modern and efficient appliances, still we cannot say that we have had material reductions in the prices. It is surely to their interests as well as ours that out-of-date and obsolete appliances should be changed for modern, but it is the gas undertakings which take all the risk of receiving an adequate return for the cost incurred, and that very often over extended periods. Many of us are doing this, and the cheaper we can buy (efficiency never neglected) the easier it is to satisfy our consumers even at a loss in consumption such replacements entail. To those who are not tackling this question in the proper manner, just a word of warning. Our competitors are quite as energetic as we are in endeavouring to improve on their present efficient appliances and are leaving no stone unturned to take not only our lighting load but every other load.

Vote of Thanks.

Mr. W. H. JOHNS said they had listened to an up-to-date Address on modern methods. He had known Mr. Barker for sixteen years—in fact, ever since he (the speaker) had been in South Wales. He had been working hard for his

Company, and for the Association, and had made an excellent President. If he had done nothing else that day but put fresh confidence in his audience, he had accomplished great work for that district and for the Industry at large. The President had shown them how he had been paving the way for better service. He (Mr. Johns) was a great believer in personal contact. The Press, and other forms of publicity, helped them considerably, but at the same time it was necessary to bring their representatives into personal contact with the consumers as far as possible. This showed the consumers that they were interested in them, as they ought to be. A contented consumer was ever so much better than a discontented one, and whenever opportunity presented itself to render better service, it was their duty to take advantage of it.

Mr. J. E. KENSHOLE seconded the vote, which was heartily accorded, and briefly acknowledged by the PRESIDENT.

New Office-Bearers.

The following office-bearers for the ensuing year were elected:

President.—H. Matterface, Monmouth.
Vice-President.—B. Taylor, Quaker's Yard.
New Members of Council.—R. L. Aspinall and J. Robb.
Treasurer.—J. H. Canning.
Hon. Secretary.—Octavius Thomas.
Auditors.—J. F. Rust and A. E. Pask.

Institution Benevolent Fund.

The HON. SECRETARY proposed that the Association subscribe ten guineas to the Benevolent Fund of The Institution of Gas Engineers. He also made an earnest appeal to members who do not already do so to subscribe individually.

Mr. H. D. MADDEN, seconding, endorsed this appeal.

The proposition was unanimously agreed to.

Continuous Verticals for Small Undertakings.

Mr. D. WALTER DAVIES, Engineer and Manager of the Gas, Water, and Electricity Departments at Tredegar, read a Paper dealing with five years' experience of upwardly heated continuous vertical retorts, and this, together with a report of the discussion, will be published in an early issue.

Before the meeting closed, a hearty vote of thanks was passed to the Chairman and Directors of the Llanelly Gas Light Company for providing accommodation for the proceedings, and for their hospitality.

It was left to the Council to decide upon the place of next meeting.

Luncheon.

Business over, members and guests proceeded to the Thomas Arms Hotel, where, to the number of eighty or more, they sat down to luncheon, on the invitation of the Chairman and Directors of the Llanelly Gas Light Company.

In the course of a short toast list, Mr. Percy Rees, Deputy-Chairman of the Company, presented the Upjohn Cup and the Dean Cup to the winners in the golf competitions on the previous day.

The President occupied the chair, and submitted the Loyal Toast, after which Mr. W. H. Johns proposed "The Town and Trade of Llanelly," this being responded to by the Mayor and the Town Clerk. The toast of the Association was entrusted to Mr. R. G. Shadbolt, who coupled with it the name of the President.

Glover-West Verticals at the Gas-Works.

By a happy coincidence, the date of the meeting fell at about the time of the putting into operation at the Llanelly Gas-Works of an installation of Glover-West verticals, comprising eight of the latest 50 in./56 in. steaming model retorts on this system, and when luncheon was over members of the Association, accompanied by the President, together with Mr. Frank West and Mr. John West, paid a visit of inspection to the new plant; tea being afterwards provided by the Company. The visit was the more timely, consequent upon the fact that the subject of vertical retorts for small gas-works had been discussed at the meeting in the morning.

The retorts are arranged in four distinct settings, each containing two retorts, and each retort is a separate and individual unit as regards coal feed, gas offtake, and coke extraction.

The retorts are heated in settings of the usual Glover-West design. Fuel gas is generated in producers fitted with steam-air injectors, so that screened breeze can be used for this purpose, releasing a corresponding quantity of large coke for sale at the maximum price.

The plant is rated on a daily total capacity of approximately ¾ million cu.ft. of gas at 425 B.Th.U. when carbonizing Welsh Navigation Run-of-Mine coal.

Golf Competitions.

What a first-class sea coast golf course can be on a perfect day was experienced on the day preceding the meeting, when a large party were welcomed at the Ashburnham Golf Club, near Llanelly. Here some interesting play was recorded both in the morning (for the Upjohn Cup) and in the afternoon (for the Dean Cup). The leading scores were as follows:

Upjohn Cup.

T. B. Walker	90 – 16 = 74
R. R. Bird	84 – 9 = 75
W. Clark Jackson	81 – 4 = 77
J. Sadler	94 – 17 = 77
C. R. Averill	91 – 13 = 78
F. D. Drake	99 – 20 = 79
M. Thornton	87 – 5 = 82
Charles Gray	98 – 16 = 82
F. Boardman	99 – 16 = 83

Dean Cup.

W. Clark Jackson	1 down
R. J. Auckland	1 ,,
R. R. Bird	1 ,,
M. Thornton	2 ,,
F. Boardman	3 ,,
J. Sadler	4 ,,
F. D. Drake	4 ,,

Unstinted praise was bestowed upon the beautifully situated golf course, and upon Mr. Joe Sadler, under whose efficient arrangements the day's proceedings passed off with the utmost smoothness. Everyone spent a thoroughly enjoyable day, and the Benevolent Fund of The Institution of Gas Engineers—Mr. Octavius Thomas's constant care—benefited very considerably through the competitions.

In the evening those who had taken part in the day's outing—to the number of about forty—dined together at the Thomas Arms Hotel, with Mr. R. J. Auckland in the chair. Prizes were presented to the winners by Mr. R. J. Rogers, who, with Mr. R. G. Shadbolt and leading officials of the Golf Club, received a hearty welcome from the Chairman.

Scottish Junior Gas Association (Eastern District)

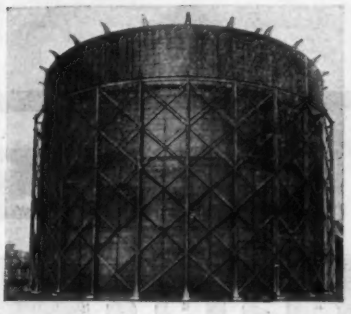
Annual General Meeting

The 31st Annual General Meeting of the Association was held in Heriot-Watt College, Edinburgh, on May 11, Mr. A. J. Doran occupying the chair. The balance-sheet showed a substantial increase in credit, though a slight drop in membership was recorded. The Education Report revealed the good work done by the Association's Representative on behalf of members, but much dissatisfaction appeared to exist through students having their courses altered before completion, thus causing delay and duplication of studies.

The following members were then elected to office:

President.—Mr. A. J. Doran, Granton Gas-Works, Edinburgh.
Vice-President.—Mr. J. M. Dow, Kirkcaldy.
Hon. Secretary and Treasurer.—Mr. A. C. Rea, Edinburgh.
Assistant Secretary and Treasurer.—Mr. Edward Alexander, Edinburgh.
Librarian and Education Representative.—Mr. A. J. Doran.
Auditors.—Mr. E. L. Farquhar, Kennoway; Mr. M. Darling, Cowdenbeath.
To Council.—Mr. L. H. W. Locke, Perth; Mr. Edward Alexander, Edinburgh; Mr. D. C. Henderson, Perth.

After the business, Mr. D. L. Dickson, Cowdenbeath, read a Paper entitled "The Storage Capacity Necessary for Present-day Requirements; the Necessary Inspection Records and Maintenance for Efficient Gasholder Working."



SHEFFIELD

4 LIFT

7,800,000 c.ft.

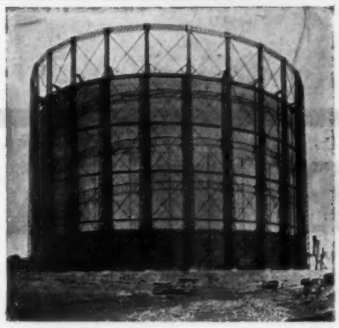
BRICK TANK

KENSAL GREEN

3 LIFT

7,600,000 c.ft.

BRICK TANK

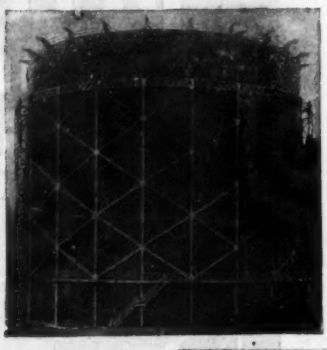


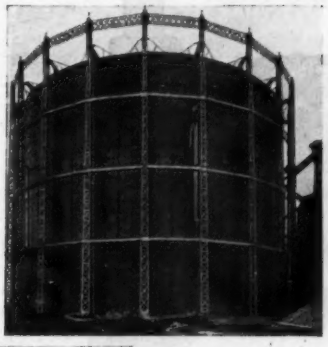
GENOA

4 LIFT

2,200,000 c.ft.

STEEL TANK





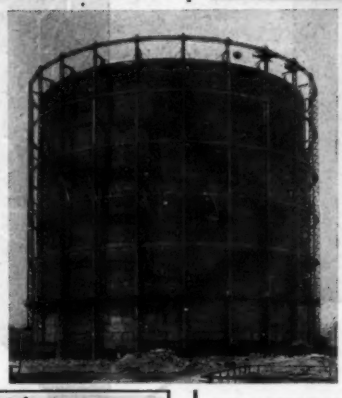
BETHNAL GREEN

3 LIFT

4,250,000 c.ft.

BRICK TANK

OUR GASHOLDER EXPERIENCE EXTENDS OVER 80 YEARS



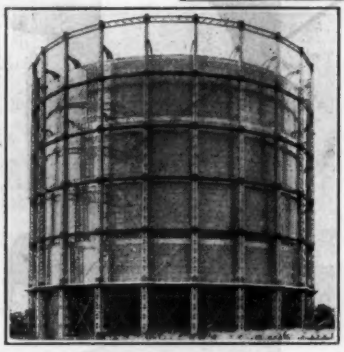
SPECIALISTS IN ALL KINDS OF GASHOLDER REPAIR WORK

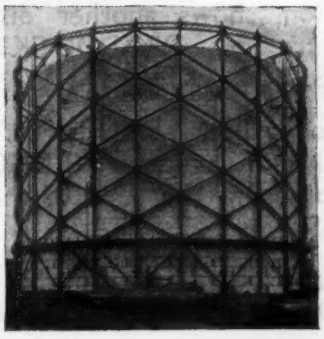
NORTH MIDDLESEX

4 LIFT

3,000,000, c.ft.

STEEL TANK



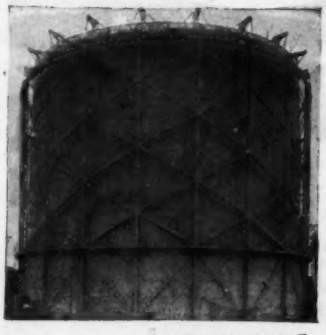


SOUTHEND

4 LIFT

2,500,000 c.ft.

STEEL TANK



HAMPTON COURT

3 LIFT

850,000 c.ft.

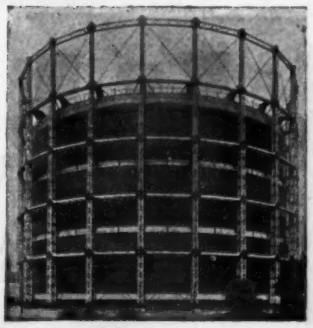
STEEL TANK

HORNSEY

4 LIFT

3,000,000 c.ft.

CONCRETE TANK



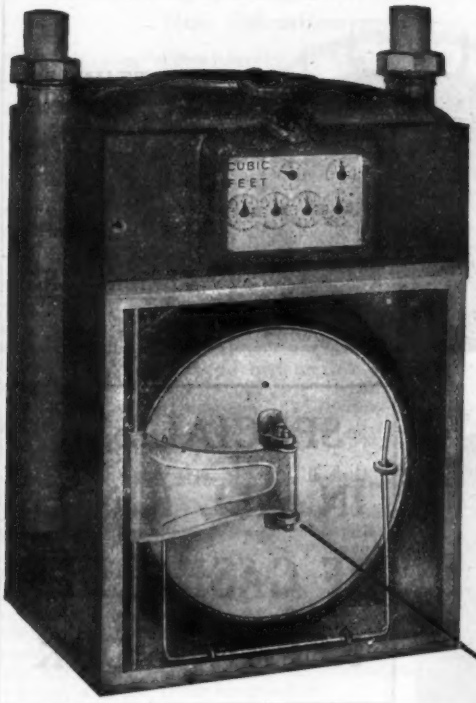
SAML. CUTLER & SONS, LTD.

39, VICTORIA STREET, WESTMINSTER, S.W. 1

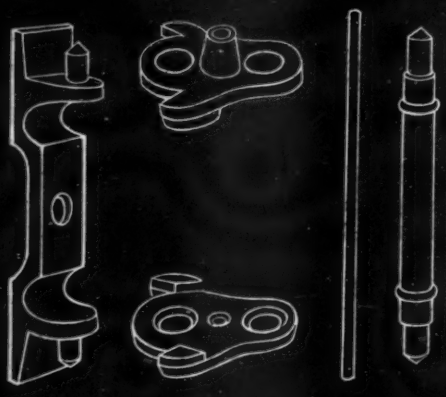
LONDON.

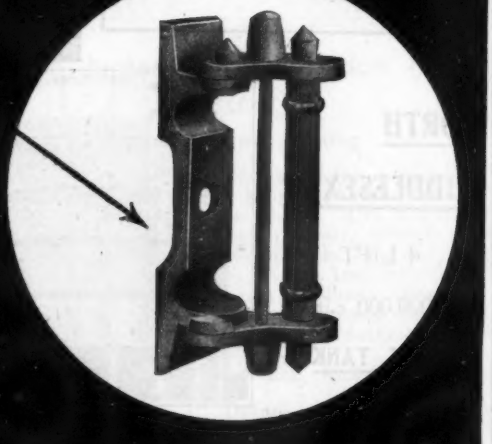
PROVIDENCE IRON WORKS, MILLWALL, E. 14

BRADDOCK'S



perfect diaphragm action





¶ This illustration shows another distinctive feature of BRADDOCK'S DRY METERS.

¶ The Special Roller Design ensures FLAT DISPLACEMENT of the CENTRE DISC definitely prolonging the LIFE of the DIAPHRAGMS.

¶ The LINKS and ROLLERS are made *only* of NON-CORRODIBLE metal.

J&J. BRADDOCK

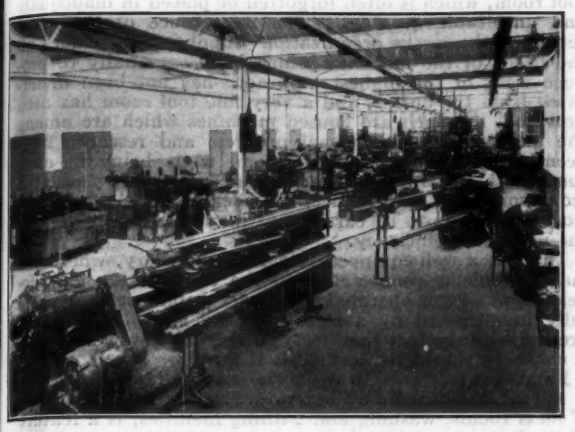
(BRANCH OF METERS LTD.)

OLDHAM

GLOBE METER WORKS
Telephone - Main (Oldham) 3815/6
Telegrams - - Braddock, Oldham

LONDON

45 & 47 Westminster Bridge Road, S.E.1
Telephone - - - - Hop 2412
Telegrams - Metrique, Lamb, London



A General View of a Section of the Assembly Shops.

FINE NEW WORKS

FOR

Ascot Gas Water Heaters, Ltd.

Introducing to the Industry an up-to-date new gas water heater factory at Neasden

The no mean task of turning out some four thousand instantaneous gas water heaters a month demands not only far-seeing and progressive direction and management with energetic and skilful staff, but also the most up-to-date plant and machinery, adequate accommodation, and comfortable working conditions. The former attributes have always been possessed by Ascot Gas Water Heaters, Ltd., but with their rapidly increasing business they have not until recently been able entirely to fulfil the latter requirements in a way they would wish.

From their small factory at Hither Green, S.E., the firm have moved to new premises at Neasden, on the North Circular Road, which represent a very fine example of design, construction and general lay-out, and will cater for the expanding business of the concern.

There has been no " official opening ceremony " in connection with these new works, which have now been in production for several months, but last week representatives of the Gas Press were privileged, through the courtesy of Dr. Bernard Friedman (Managing Director) and his co-Directors, to make a thorough inspection of the factory, and the " JOURNAL " is glad to be able to make the first introduction to the Gas Industry of these splendidly equipped and thoroughly up-to-date premises.

These Works—which are believed to be the largest in this country exclusively devoted to the production of gas-operated water heaters—have an imposing frontage, behind which is a unique suite of offices and showrooms, planned on the most up-to-date lines, and which are provided with the most modern equipment. Indeed, no effort has been spared to secure the latest thing in engineering progress, social research, and in essential equipment, to ensure the highest possible efficiency.

It is obvious to the most casual observer that the building and general lay-out have been planned to ensure the well-being and comfort of the staff, with a view to obtaining efficient and loyal service from every member. Throughout the entire suite of office, reception, and demonstration rooms, there is ample evidence that considerable care has been given to every detail, and it may be said that " ASCOT " is not only the hall-mark of a high-grade water heater, but is synonymous with modern equipment and organization.

Leaving the office buildings and visiting the works, the whole of which is on the ground level, one is at once conscious that the same degree of thought and care has been expended here. The very extensive factory building is light and extremely airy, giving excellent working conditions. Such is the first observation of this spacious factory, where thousands of water heaters are being made. Although it is clear that the factory has been planned for mass production, one feels that the objectionable elements which sometimes characterize the massing and merging of machinery and men in timed operations is absent in these well regulated works.

No expense has been spared to provide the very best and most suitable machinery with a view to producing cheap, sound, and efficient appliances, which meet the present-day exacting requirements of the Gas Industry, and which will completely satisfy those who use the Industry's chief product in their homes. That Ascot Gas Water Heaters, Ltd., are specialists in this line of business is made clear by a visit to the Works at Neasden.

A Glimpse of the Processes.

Certain aspects of production are worthy of detailed attention. Materials are received at the further end of the works, and after they are passed through the various shops, are taken into the despatch department. Both these departments are equipped with a number of large steel doors specially designed to admit the largest lorries. In the receiving department a five-ton travelling crane is used for unloading, and ample storage space is provided for all materials. Here also tubes and rods are cut to the correct sizes for production, and a strict system of inspection and testing of materials is regularly enforced.

Powerful presses are used for producing the deep drawn

This photograph of the exterior gives an idea of the extent of the new Ascot Water Heater Factory.

components, while a number of universal stamping machines produce smaller components at high speed. The capstan, turret, and automatic lathes used for machining rod and castings are of the latest design, and ensure a combination of speed and accuracy, which is so essential to economical production.

Special machines are provided which ensure the perfect construction of burners, heating bodies, heating elements, &c., while the coils and pipe bends used in the construction

Assembling the Burners.

are bent and set by machines of the Company's own design. The brazing and soldering operations are conducted with the aid of Selas gas—a gas-air mixture supplied at high pressure. This fuel is also used for the heating of the stove enamelling ovens, and the tinning baths, which are controlled in each case by " Perfecta " gas thermostats.

The electrical resistance welding machine, used for welding various water heater parts, is particularly interesting and is believed to be the only one of its kind in existence in this country. The machine incorporates two copper wheels between which a high current passes. The two edges of metal requiring to be joined are pushed slowly through between the wheels, in the course of which it is heated up to a very high temperature and the edges fused together. A perfect joint is thus effected.

Other processes in the production of the Ascot water heater include the lead-spraying of the heating element to prevent corrosive attack by any sulphur impurities in the town gas.

The plating and polishing shops contain the most up-to-date equipment, and here again all necessary operations are conducted with speed and efficiency, while maintaining a high standard of quality. The plating operations include nickel plating, chromium plating, and tin plating, the latter being used extensively for the water-ways of appliances. Situated between the plating shop and the stove enamelling shops is the de-greasing plant, through which all necessary components pass on their way to the plating or stove enamelling shops.

A well-equipped power house provides the necessary current for the plating department and for other sections of the works, while in this room also is the air compressor for provision of air under pressure for various purposes. In a spacious basement is the boiler room, containing large coke boilers for steam, hot water, and works heating purposes. Here again, as everywhere else in the factory, is ample space for extensions when required.

Testing.

Other departments include a large finished components stores and the general assembly lines. Beyond these is the row of test stands, equipped with all instruments necessary to ensure the even and accurate testing of appliances. It is of interest to note that in spite of the high speed of production which prevails throughout these works, every single appliance is fairly tested before being passed to the final assembly lines and inspection.

An important factor is that the time given for testing appliances is 45 minutes for each appliance, and conditions are such that it is impossible for any appliance which is in any way defective to be despatched. Appliances then pass to the finished heater stores, and then to the packing department, where specially trained packers are responsible for the safe transit of the finished product.

One of the most essential features of any works is the tool room, which is often forgotten or placed in inadequate and unsuitable quarters. The importance of this vital centre of the works organization—supplying as it does all the needs of the machines which have essentially to produce work of the highest accuracy—has not been underrated from the outset, and a very fine tool room has been provided, in which are housed machines which are among the finest that international progress and research have been able to produce. This room, while being in close touch with the rest of the works, is comparatively isolated from noise and disturbance, in order that the important work which has to be carried out may be discharged with the maximum efficiency.

There is a well-equipped research laboratory, where the many problems connected with the construction and development of gas-operated hot water appliances are carefully investigated by a highly trained staff. One is impressed with the fact that every complaint, however trivial, is carefully considered and dealt with.

Finally, a reference to the social and welfare side—there is a well appointed first-aid surgery, while the provision of mess rooms, washing and bathing facilities, is a feature of the factory organization.

Adjoining the works is a large tract of land, which is maintained by the Ascot Sports and Social Club. Also, friendly football and cricket matches are played with other business houses, and the Social Club affords every facility for the recreation of the employees.

After a thorough inspection of every phase of the firm's manufacturing activities the representatives of the Gas Technical Press sat down to lunch with Dr. Friedman and other senior members of the staff of the Company.

A Sporting Chance.

Dr. Friedman took the opportunity of thanking his guests for their presence on that occasion in order to see what the firm were endeavouring to do for the Gas Industry. He extended, through the medium of the Press, a cordial invitation to members of the Industry to visit their works, while he also thanked the Industry for what he described as " the sporting chance " it had given them when they first set up in this line of business a few years ago. Having briefly described some of the processes involved in the production of the " Ascot " water heater, Dr. Friedman, in conclusion, raised his glass to the health of the Gas Industry, at the same time paying tribute to the excellent Technical Press which it possessed.

One of the Heavy Stamping Machines.

Mr. Clifford A. King, Managing Director of the " JOURNAL," thanked Dr. Friedman and his co-Directors on behalf of the Technical Press for the extremely interesting morning they had spent and for the firm's kind hospitality. He wished them all prosperity in the future and asked the visitors present to join with him in drinking to the health of Ascot Gas Water Heaters, Ltd.—a toast which was very heartily accepted.

Gas Heating in the Food Industry

By Peter Lloyd

(*Concluded from p. 453 of last week's* "JOURNAL.")

Direct gas firing is used on a large scale for sugar boiling, an operation in which its cleanliness and speed of heating are important. The working efficiency depends so much on the composition of the batch that the consumption figures are apt to be somewhat misleading; they vary between 0·6 and 1·1 therms per cwt. Spray drying is a process to which gas firing is clearly applicable, using the air heaters mentioned in the previous section. Up to the present, however, it has not found any extensive use in this field.

Boiling and Frying.

Boiling operations include ham boiling, and the treatment of lobsters, crabs, sausages, beetroot, pickles, &c., which raise no particular technical problems, and in which a reasonably high thermal efficiency is obtainable without difficulty.

Frying processes include fish frying and the manufacture of potato crisps, both of which consume large quantities of gas. Fish frying, although not strictly a manufacturing process, is mentioned because of some work which has recently been carried out by the Gas Light and Coke Company, which may be of interest in connection with other operations in the food industry. This work has been concerned, as in the case of bread baking, with obtaining the maximum possible thermal efficiency so as to improve the competitive value of gas firing compared with coke breeze firing. It has been found that by increasing the gross surface of the pan an appreciable improvement in thermal efficiency may be obtained. On a standard 24-in. square pan, for instance, it has been found possible to increase the gross area of the bottom surface threefold by the insertion of a large number of ⅜-in. studs, projecting 1 in. from the surface. The results on a water-boiling test gave the following comparison:

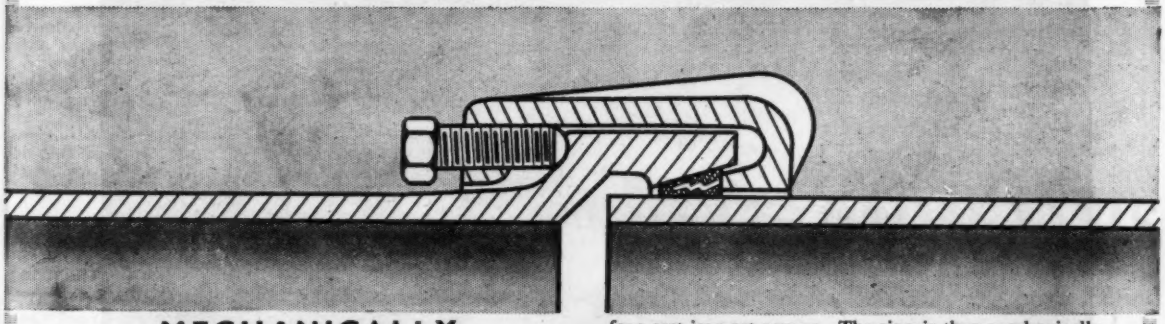
—	—	Thermal Efficiency.
Plain pan	First test	38·9%
,, ,,	Second test (Hot setting)	45·1 ,,
Studded pan	First test	45·9 ,,
,, ,,	Second test (Hot setting)	54·9 ,,

There is thus an increase of 9·8% on 45% corresponding to a saving of about 20%.

Incidental Processes.

It is largely irrelevant to the present Paper that gas is extensively used in the manufacture of many containers used in the food industry, such as in the manufacture of glass bottles, in the production and lacquering of tin-plate, the impregnation of papers and cartons, &c., nor will such operations as soldering of tin containers, or the use of gas for light or power in packing operations be discussed. Sterilization, particularly in connection with the retail milk trade, should, however, be mentioned. It is being realized by the medical officers of health in various districts that the existing regulations for the sterilization of milk bottles are not being enforced, and that in most cases the bottles are simply being washed in hot water without any attempt at effective sterilization. What is needed is a simple and relatively cheap appliance for sterilization with steam, and a number of gas-fired sterilizing cabinets have recently been put on the market to meet this demand. They consist in most cases of a self-contained unit having a trough of water at the bottom and a large steam space above it in which the bottles are placed in suitable trays. Hot water for washing can be drawn off from the water trough. The cost of sterilization in such an appliance is

The STANTON
MECHANICAL LEAD JOINT



MECHANICALLY
MADE AND HELD

For over a century engineers have felt the need for a lead pipe-joint which can be made quickly and efficiently, without special tools, by an unskilled workman. This need is now supplied by the Stanton Mechanical Lead Joint.

This Joint employs the same material as the tried and tested lead joint, yet eliminates the slow and laborious operations of lead melting, running and caulking. All the workman has to do is to slip into position two half-collars and a wedge-shaped lead joint-ring, and to tighten four cast iron set screws. The ring is then mechanically and positively compressed into a taper recess. from which it cannot be dislodged. The joint is very quickly made under the most adverse conditions—under water if necessary.

The Stanton Mechanical Lead Joint permits "drawing" of the spigot and a greater angular distortion than is possible with a caulked joint. Where heavy vibration necessitates a high degree of flexibility, the Stanton-Wilson Joint should be used.

THE STANTON IRONWORKS
COMPANY LIMITED, Near NOTTINGHAM

very low, approximately 1d. per 100 pint bottles at 6d. per therm, and it is anticipated that they will find wide application.

In conclusion, an organization which has recently been set up by the Gas Industry with a view to increasing the general utility of gas as an industrial fuel should be mentioned. A number of Industrial Centres have been established in different parts of the country to act in an advisory capacity to gas undertakings in their neighbourhood. Membership of the centres is entirely voluntary, but it already represents some 77% of the gas manufactured in Great Britain. Thus all gas undertakings, however small, are able to obtain expert advice on any subject connected with the supply of gas for industrial processes. Co-operation between the centres themselves is obtained by regular meetings and by the exchange of technical information on the fullest scale. It is hoped that this organization will be of real assistance to all industries in the further development of gas as an industrial fuel.

Primitiva Holdings, Ltd.

The Sixth Ordinary General Meeting of the shareholders of Primitiva Holdings, Ltd., was held at Winchester House, Old Broad Street, E.C. 2, on Tuesday, May 21—Mr. P. ASHLEY COOPER (Chairman of Directors) presiding.

In moving the adoption of the Report and Accounts for the year ended April 30, 1935, the CHAIRMAN observed that last year in addressing them he said that he was hopeful that, if conditions got no worse, they might be able to pay at least the same dividend this year. He hoped they would feel satisfied that they had improved on this forecast by recommending today a dividend of 3%. Even so, some might feel that, with a large carry forward, they should have recommended more. But he would remind them of two things. First, that it was their duty to preserve their property so that it would remain theirs and continue to make profits. This was a consideration which needed particular care, since the rate of exchange had moved still further against them during the past twelve months, and they would agree that no Company ever came to grief by pursuing a conservative financial policy.

The other point which he would emphasize was that it was their duty and policy to maintain the dividend of the Holdings Company at as consistent a figure as possible. They would have noticed the fluctuations in dividend of the Gas Company. It was just such fluctuations which should be avoided in the case of this Company. In spite of all the ups and downs of international trade and exchanges, they wanted if possible to give something which could be relied upon from year to year, by avoiding large variations in the dividend.

In view of the decline of the dividend earning capacity of the shares in the Gas Company since they acquired them, there was little doubt that if they could be valued they would show some depreciation. But as these shares were held in trust and could not be sold, they were a fixed asset. It was therefore their potential earning capacity with which they were principally concerned.

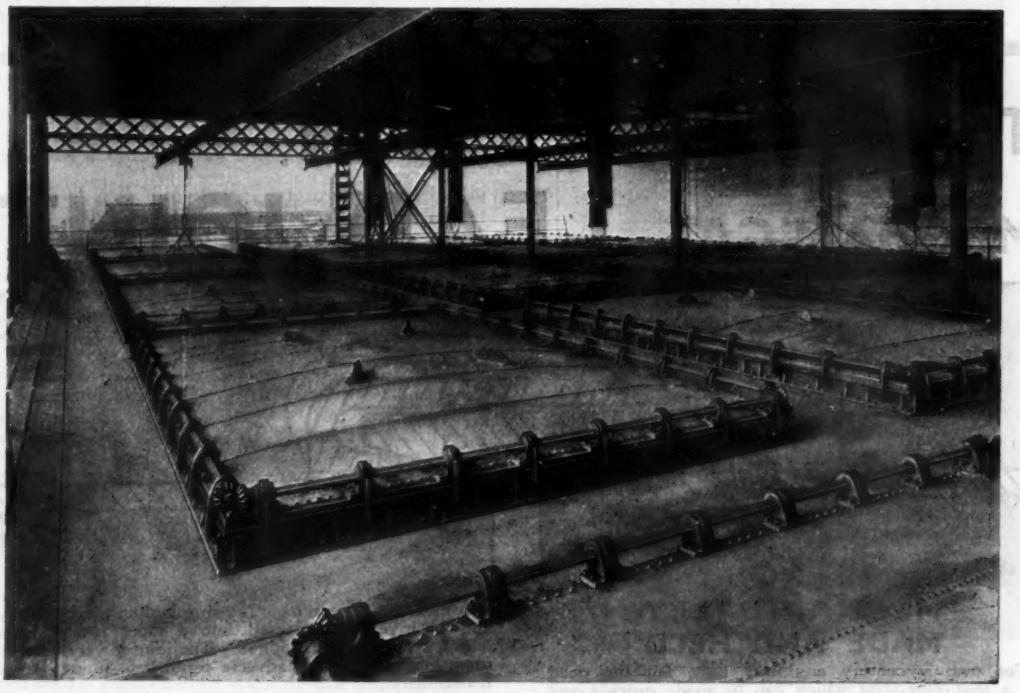
In order to pay last year's dividend, they sold some of their securities. The balance of the general investments stood in the books at £14,000, which was much less than their market value. This year they had received a cash dividend from the Gas Company.

The Gas Company's Accounts.

The Chairman went on to give details of the accounts of the Primitiva Gas Company during the year. The net increase on capital account was only some £34,000. By far the largest proportion of this new capital expenditure had been used to provide new mains services and meters. In the profit and loss account, revenue at par was up by £5,400. Income-tax was down by £14,500. The main feature was the increased difference on exchange. In 1933, they lost £92,600 on this account, but in 1934 the figure was no less than £149,000, which was practically 5% on the ordinary capital. This heavy loss was, of course, the reason for the Gas Company's small dividend for 1934. Their business had been more than maintained, and but for difference on exchange, they would be making a larger distribution.

In these difficult times, it was their policy to go slowly with extensions, but even so a gain of 6·39%, or 5,337, new consumers during the year, brought the total number to 88,867. Gas sales only increased by 2·89%. This decrease in sales per consumer was partly due to economies by consumers, and partly by their policy of destroying old and inefficient hired cookers, as they were withdrawn from service. In the year 1929, they had only 34,500 consumers who owned their own appliances. In 1934 the figure had risen to 81,500. It was their policy, in the interests of good service, completely to eliminate these cookers which were not efficient.

At the General Meeting held in 1932 he had told them that heavily increased import duties on gas stoves, &c., had forced them to discontinue importing these appliances. Subsequently, they found that they had to choose between selling locally made appliances, with which they were not entirely satisfied, or making their own. They found themselves compelled to choose



PART OF A SET OF EIGHT PURIFIERS, 46 FT. x 32½ FT., ERECTED ON STAGE FLOOR AT LIVERPOOL.

COMPLETE
PURIFIER INSTALLATIONS.
C. & W. WALKER, LTD., DONNINGTON, Near WELLINGTON—SHROPSHIRE.
LONDON OFFICE: 70, VICTORIA STREET, WESTMINSTER, S.W. 1.

the latter course, and gas cookers and geysers, made in their own shops in Buenos Aires, were now giving complete satisfaction. The Chief Engineer, and those of his staff who were responsible for the satisfactory design and production of these specialized products, were to be congratulated.

The fact that the Public Service Department and Distribution Department between them were doing good work was proved by a further reduction in the number of complaints, not only expressed as a percentage of the number of consumers, but also in the actual number recorded. It followed that the unit cost of attending to complaints, expressed as cost per consumer month, showed a further decrease during the year under review.

Although conditions in Argentina showed an improvement during 1934, the improvement was not sufficient of itself to be automatically reflected in their operations. In fact, their Departments had had to keep up continued pressure in order not to lose ground. It was therefore particularly pleasing to be able to refer to increased sales both of residuals and chemical products. The total sales under these two headings during 1934 had been equalled on only one occasion during the Company's history. The total sales of this Section during 1934, including both residuals and chemical products, amounted to over $2,800,000.

The Yacimientos Petroliferous Fiscales (Y.P.F.), which were a Department of the National Government dealing with the production of petroleum from wells owned by the State, and which also owned a large Petroleum Distillery, were now selling propane, a product of petroleum distillation, in steel cylinders. This bottled gas, as it was called, was well known in the United States, and it was beginning to be distributed in France. Experience in these countries had proved that while bottled gas was, of course, better than no gas at all, it inevitably made way for town gas as soon as mains were extended. In Buenos Aires, the Authorities were concentrating their sales efforts outside their piped zones so that, so far as the Company could see at present, the service they were giving was complementary and not competitive. They believed that they would be in a position to assist the Authorities to dispose of their propane, and they had already expressed their willingness to do so.

The Chairman also stated that they had appointed Mr. W. M. Codrington a Director of the Gas Company, and Mr. Tuson to the Board of the Holding Company.

In conclusion, he summed up by saying that so far as prospects for the current year were concerned, if conditions got no worse, they hoped at least to maintain the same rate of dividend next year.

The Chairman then formally moved the adoption of the Report and Accounts for the year ended April 30, 1935, and that a dividend at the rate of 3% (less income-tax at 4s. 6d. in the £) be paid on the ordinary stock of the Company.

This was seconded by Mr. Frank H. Jones, M.Inst.C.E., and carried unanimously.

Legal Intelligence

Alleged Negligence at Wandsworth

The Wandsworth and District Gas Company were successful defendants in an action heard in the High Court in which a claim for damages was made against them by Mr. Elwyn Kyte, of Simpson Street, Battersea. Mr. Kyte, who is 51 years of age, stated that he was engaged by a firm of steel erectors in November last year to attend to some pipes in the Company's retort house and he was overcome by gas fumes. He had not yet recovered and he alleged negligence on the Company's part in not ensuring that the gas should not escape from pipes while they were being attended to.

A body of evidence was heard for the defence, and in the end, the judge held that Mr. Kyte's illness had not been proved to have come about through any negligence on the Company's part. He accepted the evidence that the necessary plugs were inserted into the pipes before work was commenced and found for the Company with costs. It was announced that, unless there was an appeal, the Company would not press for their costs.

Gas Undertakings' Results

Peterborough.

The report of the Directors of the Peterborough Gas Company for the period Jan. 1, 1934, to March 31, 1935, states that interim dividends of 5% per annum on the new preference "A" shares and 7½% per annum on the consolidated ordinary stock, both less income-tax, were paid in May last for three months ended March 31, 1934, and a further interim dividend in November last for the half-year to Sept. 30, 1934. The Directors recommend the payment of dividends at the same rates, less income-tax, for the half-year ended March 31, 1935. The payment of such dividends will absorb the sum of £3,852, leaving a balance of £12,957, which the Directors recommend shall remain at the credit of the profit and loss account. In accordance with the resolution passed at the last Proprietors' meeting, tenders for £15,000 (nominal value) consolidated ordinary stock of the Company were invited the following month. The issue was largely over-subscribed, the average price obtained being £157 9s. 8d.%. The number of cookers, gas fires, wash boilers, coke fires, water heaters, and other apparatus supplied and fixed during the above period was 1,598, and the quantity of gas sold was 370,151,400 c.ft., which represents a most satisfactory increase.

SAWER & PURVES
(BRANCH OF METERS LTD.)

OUR MAIN TAPS
ARE UNSURPASSED
FOR QUALITY.

PRICES RIGHT.

May We Quote You?

No. 119.

Makers of

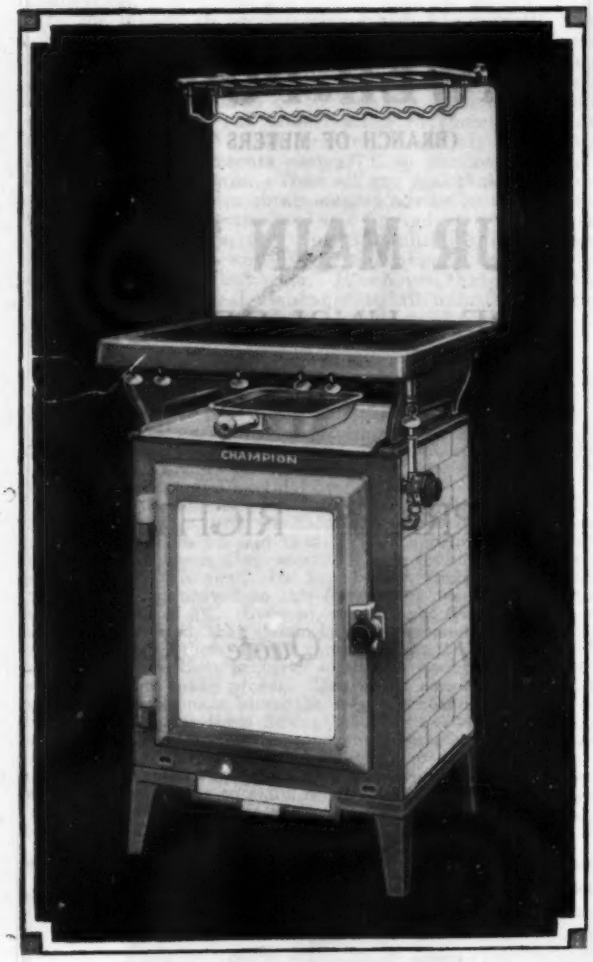
ORDINARY . . . .
PREPAYMENT . . .
TWO-COIN . . . .
HIGH CAPACITY .

METERS

DERBY ROAD
WATFORD
Phone: 2645
Grams: 2645 Sawer, Watford

RADFORD ROAD
NOTTINGHAM
Phone: 75202
Grams: Sawer, Nottingham

MILES PLATTING
MANCHESTER, 10
Phone: Collyhurst 2289
Grams: Sawer Manchester



FINISH

The greatest selling point of all

PORCELIRON

The greatest name in finishes

We claim to possess a unique experience in the application of industrial enamel finishes. We actually enamelled gas cookers fifty years ago, and "Porceliron" has been a registered trade mark of the Company for over thirty of those years. The advantages of all this accumulated experience are evident in the latest models of Cannon Cookers; and it is within the power of any member of the Gas Industry to examine the undoubted beauty and the wonderful durability of "Porceliron" finish at first hand. Particulars from the Sole Makers: Cannon Iron Foundries, Ltd., Deepfields, Nr. Bilston, Staffs.

Gas Markets and Manufactures

Stock Market Report

(For Stock and Share List, see later page)

The previous heavy buying and consequent rapid rise in values led to some profit-taking at the outset last week and prices became easier. Later, however, political events both at home and in Germany created a good impression, markets reverted to active conditions, and under the lead of gilt-edged securities upward movements became the order of the day in most departments. A good tone also prevailed in the Industrial market and business was well spread, a notable feature being the strength of shares in the heavy industries group.

The general outlook was also reflected in the Gas Market, and a long list of transactions was recorded each day. It will be seen in the Stock and Share List that a number of issues were marked up in value, the chief of these being a gain of 5 points British 7% Preference, 4 points Liverpool 5% Ordinary, and 6d. per share Newcastle and Gateshead Consolidated and South Eastern Gas Corporation Ordinary. The only set-back of note was that of North Middlesex, which fell 7 to 168-168.

The first report and accounts of the South-Western Gas and Water Corporation have now been issued, and the Directors point out that the period under review—*i.e.*, Feb. 14, 1934, to March 31, 1935, has been one of acquisition during which capital has been issued to meet fresh purchases. At March 31 the issued share capital was £507,725 and debenture stock £150,000, while investments in subsidiaries and other companies amounted to £610,249. The total revenue, which does not include a full year's income from investments, was £22,214, and after providing for income-tax, debenture interest, and expenses, the Directors recommend the payment of a dividend of 5% on the ordinary shares from the respective dates from which these shares rank for dividend. The ordinary shares have been changing hands at round about 28s., so that the yield works out at £4 7s.%.

The Associated Gas and Water Undertakings, Ltd., have also issued their first report and accounts—viz., for the period from Dec. 4, 1933, to March 31, 1935. Income from investments and other sources amounted to £5,006, and after the payment of general charges, interest, &c., the profit is £4,344. An interim dividend at the rate of 5% per annum for the period to Dec. 31 last was paid in January, and the Directors now propose to distribute a final dividend at a similar rate.

Current Sales of Gas Products

The London Market for Tar Products.

May 27.

There are no particular changes to record in the Tar Products market and values continue steady as follows:

Pitch, about 40s. per ton f.o.b.

Creosote, about 5¾d.

Refined tar, 4d. per gallon in bulk at makers' works.

Pure toluole, 2s. 2d. to 2s. 3d.; pure benzole, 1s. 7d. to 1s. 8d.; 95/160 solvent naphtha, 1s. 5d.; and 90/160 pyridine about 5s. 6d.—all per gallon naked at makers' works.

Tar Products in the Provinces.

May 27.

The average prices of gas-works products during the week were: Gas-works tar, 20s. to 25s. Pitch—East Coast, 37s. to 39s. f.o.b, West Coast—Manchester, Liverpool, Clyde, 37s. to 39s.* Toluole, naked, North, 1s. 8d. to 1s. 9d. Coal-tar crude naphtha, in bulk, North, 6½d. to 6¾d. Solvent naphtha, naked, North, 1s. 4½d. to 1s. 4¾d. Heavy naphtha, North, 9¾d. to 10¾d. Creosote, *ex* works, in bulk, North, liquid and salty, 4¾d. to 4⅞d.; low gravity, 4⅝d. to 4¾d.; Scotland, 4⅝d. to 4⅞d. Heavy oils, in bulk, North, 4d. to 4¼d. Carbolic acid, 60's, 2s. to 2s. 1d. Naphthalene, £10 to £11. Salts, 55s. to 75s., bags included. Anthracene, "A" quality, 2½d. to 3d. per minimum 40%, purely nominal; "B" quality, unsalable.

* All prices for pitch are now quoted on the basis of f.o.b. In order to arrive at the f.a.s. value at any port it will be necessary to deduct the loading costs and the tolls whatever they may be.

Tar Products in Scotland.

GLASGOW, *May 25.*

Prices continue steady in this district with demand, in most cases, about equal to supply.

Crude gas-works tar.—The actual value is 28s. to 30s. per ton *ex* works in bulk.

Pitch.—Prices are purely nominal at round 37s. 6d. per ton f.o.b. Glasgow for export and 37s. 6d. per ton *ex* works in bulk for home trade.

Refined tar is available in large quantities and competition continues keen. Makers are holding for about 3d. per gallon naked at makers' works.

Creosote oil is in ever increasing demand, and, with production inclined to be reduced, prices are firm. B.E.S.A. Specification, 5d. to 5¼d. per gallon; low gravity, 5¼d. to 5½d. per gallon; and neutral oil, 5½d. to 5⅝d. per gallon; all f.o.r. in bulk.

Cresylic acid.—Business is on a low scale, but quotations are being maintained. Pale, 97/99%, 1s. 1¼d. to 1s. 2¼d. per gallon; dark, 97/99%, 1s. to 1s. 0½d. per gallon; and pale, 99/100%, 1s. 2½d. to 1s. 3¼d. per gallon; all *ex* works naked.

Crude naphtha.—Available supplies command 4¼d. to 4½d. per gallon, according to quality and district.

Solvent naphtha.—90/160 grade is 1s. 3d. to 1s. 3½d. per gallon, and 90/190 heavy naphtha is 10d. to 11d. per gallon.

Motor benzole is valued at 1s. 2½d. to 1s. 3¼d. per gallon in bulk at makers' works.

Pyridines.—90/160 grade is 5s. 6d. to 6s. per gallon, and 90/140 grade, 6s. to 6s. 6d. per gallon.

Benzole Prices.

These are considered to be the market prices for benzole at the present time:

		s.	d.		s.	d.	
Crude benzole		0	9½	to	0	10	per gallon at works
Motor	,,	1	3	,,	1	3½	,, ,, ,,
90%	,,	1	4	,,	1	4½	,, ,, ,,
Pure	,,	1	7½	,,	1	8	,, ,, ,,

Contracts Advertised To-Day

Boiler (Waste Heat) Installation.
Great Yarmouth Gas Company. [p. 590.]

Coal.
Droitwich Gas Department. [p. 590.]

Coke Handling Plant Extension.
Walsall Gas Department. [p. 590.]

Concrete Bunkers, &c.
Walsall Gas Department. [p. 590.]

Electric Motors, &c.
Walsall Gas Department. [p. 590.]

Elevators, Conveyors, &c.
Walsall Gas Department. [p. 590.]

Gasholder, &c., &c.
Warrington Gas Department. [p. 589.]

Meters and Fittings, and Meter Repairs.
Birkenhead Corporation. [p. 590.]
Mansfield Corporation. [p. 590.]

Painting and Cleaning Gasholders.
Lincoln Gas Department. [p. 590.]

Pipes, &c.
Birkenhead Corporation. [p. 590.]

Retorts.
Droitwich Gas Department. [p. 590.]

Stores (Tools, Tinware, Oils, Paints, &c.).
Birkenhead Corporation. [p. 590.]

Trade Notes

Koppers Circulation Ovens for France.

A contract has just been signed for the erection of a battery of 28 Koppers circulation coke ovens in the Pas-de-Calais coalfield for the Compagnie des Mines de Houille de Courrières at Billy-Montigny. This plant, which is to produce high-grade metallurgical coke, consists of large modern ovens 13 ft. 10 in. in height and 40 ft. in length. The mean width of the oven chamber is 17 in. each oven holding 14 tons of coal. The carbonizing time varies between 25 and 19 hours, according to the type of coke to be produced, so that the capacity of the battery is from 308 to 406 tons of coal per day. Since the Koppers circulation oven was first introduced in the year 1929, no less than 1,052 of these ovens have now been ordered, and it is noteworthy that this period has included the years of industrial depression during which coke oven construction like that of other industrial enterprises involving capital expenditure had nearly ceased.

ONE OF THE WELL-KNOWN FEATURES OF

WEST'S MECHANICAL HANDLING SYSTEMS

The West Coal Breaker

•

Coke Cutters and Graders

•

The West Lip-bucket Conveyor with Automatic forced Lubrication

•

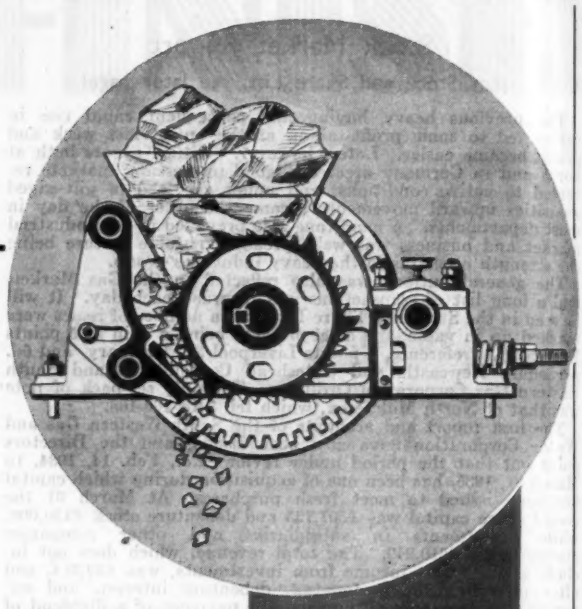
Belt Conveyors, Elevators and Skip-hoists

•

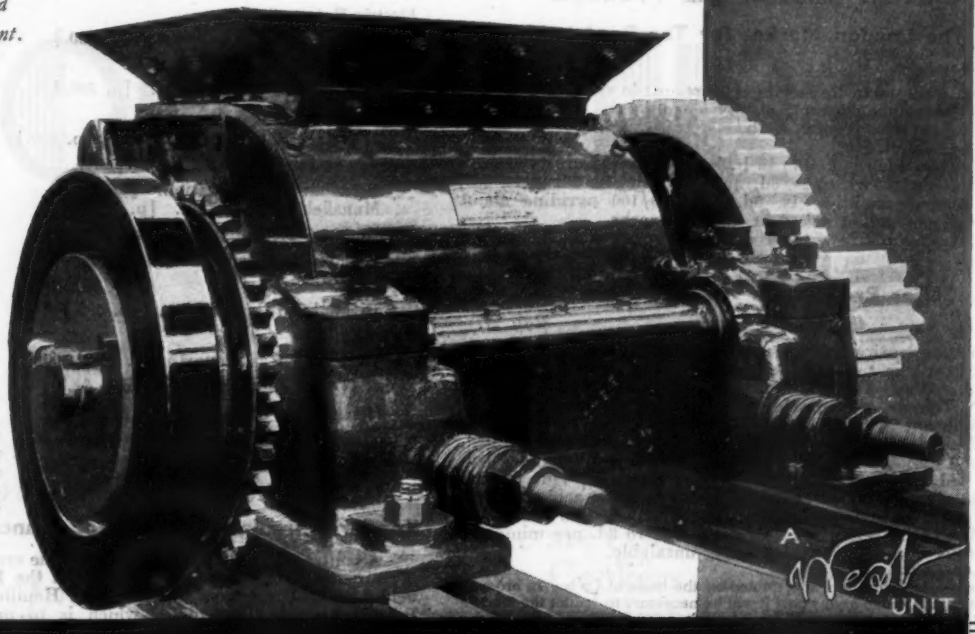
Wagon Tipplers, Telpherage and Crane Equipment. etc.

PREPARING RUN-OF-MINE COAL . . .

for the carbonizing process or to be dealt with conveniently in mechanical stokers is the particular duty of the West Single-roll Breaker, a development of the earlier double-roll type designed to take the maximum advantage of modern conditions. Both these forms of the West coal breaker have won a world-wide reputation for dependability in all circumstances and with all classes of coal. Extremely low power consumption in relation to capacity is an outstanding feature of this unit.



All component parts are capable of easy replacement, and the size of broken coal can be varied within wide limits by a simple adjustment.



The machine is designed to occupy a minimum of space, particularly in the vertical direction.

THE *West* COAL BREAKER

WEST'S GAS IMPROVEMENT COMPANY, LTD.

MANCHESTER : Albion Ironworks, Miles Platting LONDON : Regent House, Kingsway, W.C.2

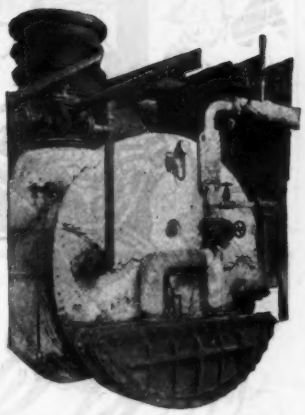
STOCK AND SHARE LIST

Official Quotations on the London and Provincial Stock Exchanges

Issue. £	Share	When ex-Dividend.	Dividends. Prev. Hf. Yr. % p.a.	Dividends. Last Hf. Yr. % p.a.	NAME.	Quotations, May 24.	Rise or Fall on Week.	Transactions, Lowest and Highest Prices During the Week.
1,551,868	Stk.	Mar. 11	7	7	Alliance & Dublin Ord. ...	130—140	+2	139½
374,000	,,	Dec. 17	4	4	Do. 4 p.c. Deb. ...	90—100	...	98
557,655	,,	Feb. 18	7	7	Barnet Ord. 7 p.c. ...	165—170	...	...
300,000	¼	Apl. 8	1/4½	1/9⅜	Bombay, Ltd.	27/6—29/6	...	...
178,480	Stk.	Feb. 18	9½	9½	Bournemouth sliding scale ...	220—230	...	...
550,050	,,	,,	7	7	Do. 7 p.c. max. ...	167—172	...	...
439,160	,,	,,	6	6	Do. 6 p.c. Pref. ...	147—152	...	...
50,000	,,	Dec. 17	3	3	Do. 3 p.c. Deb. ...	86—91	...	90
262,025	,,	,,	4	4	Do. 4 p.c. Deb. ...	105—110	...	...
335,000	,,	,,	5	5	Do. 5 p.c. Deb. ...	125—130	...	128
357,900	,,	Feb. 18	7½	7½	Brighton, &c., 6 p.c. Con. ...	173—178	...	175½
649,955	,,	,,	6¼	6¼	Do. 5 p.c. Con. ...	153—158	...	...
205,500	,,	,,	6	6	Do. 6 p.c. B. Pref.	145—150	...	148—149½
1,487,500	,,	Feb. 4	5	5	Bristol, 5 p.c. max.	121—123*a*	...	...
120,420	,,	Dec. 17	4	4	Do. 1st 4 p.c. Deb. ...	102—104*a*	...	...
217,870	,,	,,	4	4	Do. 2nd 4 p.c. Deb. ...	102—104*a*	...	...
328,790	,,	,,	5	5	Do. 5 p.c. Deb.	122—124*a*	...	...
855,000	,,	Mar. 11	7	8	British Ord.	155—160	+½	156
100,000	,,	Dec. 17	7	7	Do. 7 p.c. Pref.	155—165	+5	...
350,000	,,	,,	5	5½	Do. 5½ p.c. "B" Cum. Pref.	114—119	...	...
120,000	,,	,,	4	4	Do. 4 p.c. Red. Deb. ...	97—102	...	...
450,000	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	111—116	...	...
100,000	10	22 May '33	6	4	Cape Town, Ltd.	1—3	...	...
100,000	10	6 Nov.'33	4½	4½	Do. 4½ p.c. Pref. ...	1—3	...	...
150,000	Stk.	Dec. 17	4½	4½	Do. 4½ p.c. Deb. ...	85—90	...	...
626,860	,,	Jan. 21	6	6	Cardiff Con. Ord.	130—135	...	...
237,860	,,	Dec. 17	5	5	Do. 5 p.c. Red. Deb.	105—110	...	...
157,150	,,	Feb. 4	5	6½	Chester 5 p.c. Ord.	111—116*b*	...	113
98,936	1	Mar. 25	2/-	2/-	Colombo, Ltd., Ord.	1⅞—1¾	...	...
24,500	1	,,	1/4½	1/4½	Do. 7 p.c. Pref. ...	20/6—22/6	...	...
609,204	1	Mar. 25	-/11/4B	-/11/4B	Colonial Gas Assn. Ltd. Ord.	20/—22/-	...	20/9
296,053	1	,,	1/3·30	1/3·30	Do. 8 p.c. Pref.	25/6—27/6	...	27/- —27/6
1,775,005	Stk	Feb. 4	5	6	Commercial Ord.	107—112	−1	107—108
475,000	,,	Dec. 3	3	3	Do. 3 p.c. Deb. ...	85—90	...	...
286,344	,,	Feb. 18	5	5	Do. 5 p.c. Deb. ...	123—128	...	124
807,560	,,	Feb. 18	7	7	Croydon sliding scale...	155—160	...	158
569,590	,,	,,	5	5	Do. max. div. ...	112—117	...	115—116
620,385	,,	Dec. 17	5	5	Do. 5 p.c. Deb. ...	125—130	...	125—127
542,270	,,	Feb. 18	7	10	Derby Con.	185—195*c*	...	...
55,000	,,	Dec. 17	4	4	Do. 4 p.c. Deb. ...	100—105*c*	...	...
239,000	,,	Feb. 4	5	5	East Hull Ord. 5 p.c. ...	108—113	...	108—109½
181,625	,,	Feb. 4	6	6	East Surrey Ord 5 p.c. ...	131—136	...	133—134½
175,609	,,	Dec. 17	5	5	Do. 5 p.c. Deb. ...	120—125	...	...
1,002,180	,,	Mar. 11	†	†7	European, Ltd.	112—115	...	112½—114½
19,313,481	,,	Feb. 4	5⅝	5⅝	Gas Light & Coke 4 p.c. Ord.	27/3—28/3*f*	...	27/6—28/-
2,600,000	,,	,,	3½	3½	Do. 3½ p.c. max.	85—90	...	87⅜—89
4,477,106	,,	,,	4	4	Do. 4 p.c. Con. Pref. ...	104—109	...	107—108
6,102,497	,,	Dec. 3	3	3	Do. 3 p.c. Con. Deb. ...	88—93	...	90½—91½
3,642,770	,,	,,	5	5	Do. 5 p.c. Red. Deb. ...	115—120	...	...
3,500,000	,,	,,	4½	4½	Do. 4½ p.c. Red. Deb. ...	111—116	...	114—115½
270,466	,,	Feb. 18	6	6	Harrogate New Cons. ...	135—140	...	...
140,000	1	Mar. 25	1/7½	1/7½	Hongkong & China, Ltd. ...	1¼—1½	...	...
213,200	Stk.	Feb. 18	6	6	Hornsey Con. 3½ p.c....	128—138	...	...
5,600,000	,,	May 13	10	14	Imperial Continental Cap. ...	208—213*	...	209½—212
223,130	,,	Jan. 21	3½	3½	Do. 3½ p.c. Red. Debs.	91—96	...	...
285,242	,,	Feb. 18	8½	8½	Lea Bridge 5 p.c. Ord. ...	172—182	...	...
2,167,410	,,	Feb. 18	6	6	Liverpool 5 p.c. Ord....	140—144*b*	+4	140
245,500	,,	Dec. 17	5	5	Do. 5 p.c. Red. Pref. ...	105—110*b*	...	...
306,083	,,	Jan. 16	4	4	Do. 4 p.c. Deb. ...	104—107*b*	...	...
165,736	,,	Feb. 18	8	10	Maidstone 5 p.c. Cap. ...	185—195	...	...
63,480	,,	Dec. 17	3	3	Do. 3 p.c. Deb. ...	83—88	...	84
75,000	,,	Dec. 3	†10	†10	Malta & Mediterranean ...	205—215	...	215
392,000	—	Apl. 1	5½	5½	Metropolitan (of Melbourne) 5½ p.c. Red. Deb.	100—105	...	...
231,978	Stk.	Feb. 4	5	5	M. S. Utility "C" Cons. ...	110—115	...	...
818,657	,,	,,	4	4	Do. 4 p.c. Cons. Pref.	102—107	...	104½
360,075	,,	Dec. 17	4	4	Do. 4 p.c. Deb. ...	103—108	...	...
148,955	,,	,,	5	†5	Do. 5 p.c. Deb. ...	125—130	...	...
125,000	—	Jan. 2	11/8	3½	Do. 3½ p.c. Rd. Rg. Bds.	98—101	...	...
675,000	,,	May 28	†6	††3	Montevideo, Ltd.	50—60	...	52—53
2,061,315	,,	Feb. 18	5	5⅔	Newcastle & Gateshead Con.	26/3—27/3*df*	+-/6	...
682,856	,,	,,	4	4	Do. 4 p.c. Pref. ...	106—107*d*	...	...
776,706	,,	Dec. 17	3½	3½	Do. 3½ p.c. Deb. ...	101½—102½*d*	...	...
277,285	,,	Oct. 8	5	5	Do. 5 p.c. Deb. '43 ...	105—107*d*	...	...
274,000	,,	Feb. 4	5	5	Newport (Mon.) 5 p.c. max....	115—120*a*	...	...
225,000	,,	Feb. 18	7½	7½	North Middlesex 6 p.c. Con.	163—168	−7	163—164
396,160	,,	Feb. 4	5	5	Northampton 5 p.c. max. ...	105—110	...	...
300,000	,,	Apl. 29	†9	†7	Oriental, Ltd.	167—172	...	...
416,617	,,	Dec. 17	8	8	Plym'th & Stonehouse 5 p.c.	165—170	...	166
504,416	,,	Feb. 4	8	8½	Portsm'th Con. Stk. 4 p.c. Std.	175—180	+2	176
241,446	,,	,,	5	5	Do. 5 p.c. max. ...	110—115	...	112
114,000	,,	Jan. 21	5	5	Preston 5 p.c. Pref.	108—113	...	...
1,736,968	Stk.	Feb. 18	6	6	Sheffield Cons.	142—144*e*	...	...
95,000	,,	Jan. 7	4	4	Do. 4 p.c. Deb. ...	103—106*e*	...	...
133,201	,,	Feb. 18	8½	5	Shrewsbury 5 p.c. Ord. ...	142—147	...	...
90,000	10	May 28	‡4	‡3	South African	3—4	...	...
1,061,779	1	May 13	1/2⅜	1/2⅜	South East'n Gas Cn. Ld. Ord.	27/—29/-*	+-/6	28/1½
845,016	1	Mar. 11	-/10½	-/10½	Do. 4½ p.c. Red. Cum. Pref.	22/—23/-	+-/3	22/6—22/10½
450,000	Stk.	Feb. 4	74/4	4	Do. 4 p.c. Red. Deb. ...	100—103	...	...
6,709,895	,,	Feb. 4	5	6½	South Met. Ord.	130—135	...	131—133½
1,135,812	,,	,,	6	6	Do. 6 p.c. Irred. Pf. ...	147—152	...	148—150
850,000	,,	,,	4	4	Do. 4 p.c. Irred. Pf. ...	104—109	...	106½—107
1,895,445	,,	Dec. 17	3	3	Do. 3 p.c. Deb. ...	87—92	...	88⅜—98½
1,000,000	,,	Jan. 7	5	5	Do. 5 p.c. Red. Deb....	113—118	...	116
209,820	,,	Feb. 18	8½	8½	South Shields Con.	174—176*d*	...	...
1,543,795	,,	Feb. 18	6	6	South Suburban Ord 5 p.c. ...	130—135	...	...
512,825	,,	,,	5	5	Do. 5 p.c. Pref. ...	121—126	...	123½
500,000	,,	,,	4	4	Do. 4 p.c. Pref. ...	102—107	...	...
888,587	,,	Dec. 17	5	5	Do. 5 p.c. Deb. ...	124—129	...	128
250,000	,,	,,	4	4	Do. 4 p.c. Deb. ...	103—108	...	...
647,740	,,	Feb. 4	5	5	Southampt'n Ord. 5 p.c. max.	114—119	...	...
121,275	,,	Dec. 17	4	4	Do. 4 p.c. Deb.	102—107	...	...
350,000	,,	Feb. 4	5½	5½	Swansea 5½ p.c. Red. Pref. ...	115—120	...	116—117½
200,000	,,	Dec. 17	6½	6½	Do. 6½ p.c. Red. Deb. ...	100—105	...	...
1,076,490	,,	Feb. 18	6⅔	6⅔	Tottenham and District Ord.	148—153	...	151
409,835	,,	,,	5½	5½	Do. 5½ p.c. Pref. ...	131—136	...	...
62,235	,,	,,	5	5	Do. 5 p.c. Pref. ...	120—125	...	124—124½
199,005	,,	Dec. 3	4	4	Do. 4 p.c. Deb. ...	103—108	...	...
369,774	,,	Feb. 4	7	7	Uxbridge, &c., 5 p.c. ...	150—155	...	...
108,330	,,	,,	5	5	Do. 5 p.c. Pref. ...	118—123	...	...
1,326,700	,,	Feb.	7	7	Wandsworth Consolidated ...	155—160	...	156—158
1,371,373	,,	,,	5	5	Do. 5 p.c. Pref. ...	121—126	...	124—126
1,317,964	,,	Dec. 17	5	5	Do. 5 p.c. Deb. ...	126—131	...	...
208,300	,,	,,	26/8	4	Do. 4 p.c. Deb. ...	104—109	...	...
158,400	,,	Feb. 18	5	6g	Winchester W. & G. 5 p.c. Con.	116—121	...	...

Quotations at :—*a*.—Bristol. *b*.—Liverpool. *c*.—Nottingham. *d*.—Newcastle. *e*.—Sheffield. *f*.—The quotation is per £1 of Stock. *g*.—Paid £3, including 10s. on account of back dividends. * Ex. div. † Paid free of income-tax. ‡ For year.

Permac
METAL-TO-METAL JOINTING MATERIAL



Front view of a Benzole Rectification Still. All joints are made with "Permac."

Photograph of "Permac" joints in an important London Gas Works.

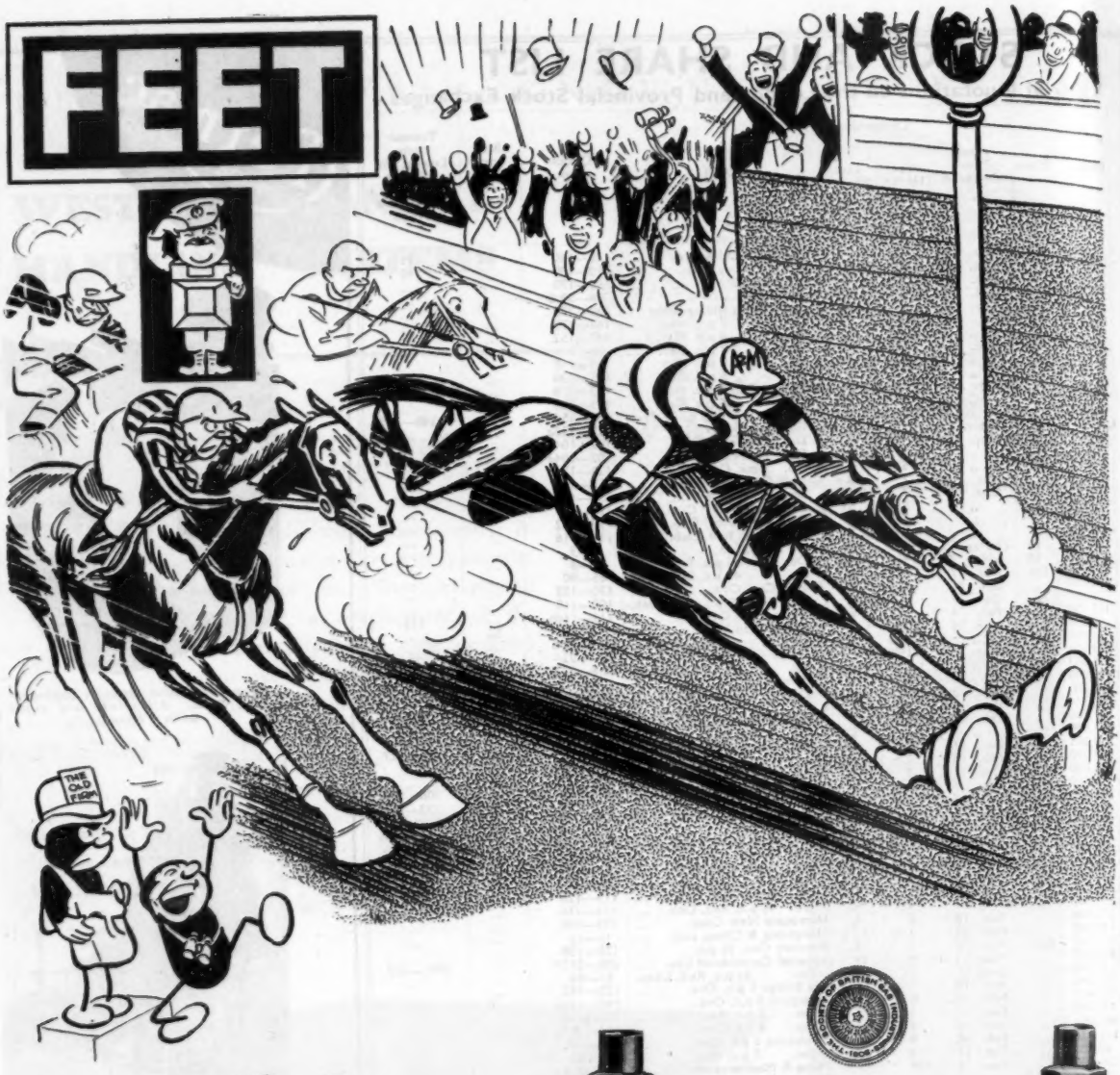
For leak-proof Joints

In Gas Works throughout the country and on important coke-oven plant "Permac" metal-to-metal jointing material has been *proved* to withstand the most severe conditions. "Permac" holds the joint tight against the action of acids and crude oils. Use it also on less difficult joints — water and steam — and you are equally certain of success.

Permac
METAL-TO-METAL JOINTING MATERIAL.

Send for particulars to the makers:—

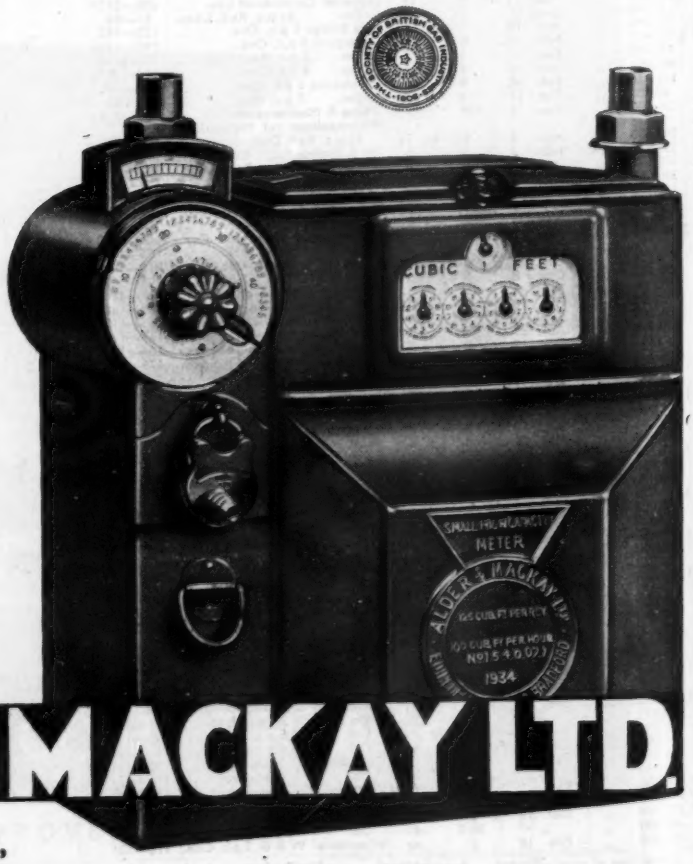
THOMAS & BISHOP LTD.
37, Tabernacle St.
LONDON, E.C. 2



TRUSTY THOROUGHBRED FEET

OUR SELECTION "OPTIONAL"

BY "ALDER & MACKAY"
OUT OF "EDINBURGH"
— FOR EVEN MONEY —
FOR WHEN IT COMES TO
THE MEASUREMENT OF
CUBIC FEET OF GAS
THE "ALDER & MACKAY"
"OPTIONAL" METER
IS A WINNER



ALDER & MACKAY LTD.

EDINBURGH, LONDON,
BRADFORD & BRANCHES

PUBLISHERS' NOTICE.

TO CORRESPONDENTS: No notice can be taken of anonymous communications, unless authenticated by the name and address of the writer (not necessarily for publication).

TO ADVERTISERS.

NOON ON TUESDAY is the latest hour for receipt of advertisement copy for the following day's issue.

FIRST POST ON MONDAY is the latest for receipt of alterations of standing advertisements.

RATES FOR UNDISPLAYED ADVERTS: Situations Wanted, Six Lines and under (about 36 words), 3s.; each additional Line. 6d. Situations Vacant, Apparatus Wanted and for Sale, Contracts, Public Notices, &c., 9d. per Line—minimum 4s. 6d. An additional charge of 6d. is made where replies are addressed c/o the "JOURNAL."

Full Schedule of Advertising Rates on application.

TERMS OF SUBSCRIPTION.

United Kingdom and Ireland — Advance Rate { 35/- per annum. 18/- per half year. Credit Rate { 40/- per annum. 21/- per half year.

Dominions and Colonies and United States } 35/- per annum, in advance.

Other Countries in the Postal Union } 40/- per annum, in advance.

A copy of the "G.J." Calendar and Directory is presented to Continuous Subscribers.

WALTER KING, LTD., 11, Bolt Court, Fleet Street, London, E.C. 4.
Telephone: Central 2236-7 (2 lines). Telegrams: "GASKING, FLEET LONDON."

FRESH OXIDE

SPENT OXIDE

GAS PURIFICATION & CHEMICAL COMPANY LIMITED,

PALMERSTON HOUSE,
34, OLD BROAD STREET,
LONDON, E.C. 2.

(ESTABLISHED 1873.)

Telegrams: "PURIFICATION, STOCK, LONDON."
Telephone: LONDON WALL 9144.

THE BRITISH
GAS PURIFYING MATERIALS
CO. LTD.
LONDON ROAD, LEICESTER.

MODERN PURIFIERS
REQUIRE
EFFICIENT
PURIFYING MATERIALS

ENQUIRIES SOLICITED

SPENT OXIDE WANTED

J. & J. BRADDOCK (Branch of Meter Limited), Globe Meter Works, OLDHAM, and 45 & 47, Westminster Bridge Road, LONDON, S.E. 1.

WET AND DRY GAS METERS, PREPAYMENT METERS, STATION METERS AND GOVERNORS

REPAIRS RECEIVE PROMPT ATTENTION.

Telephones:
Main (Oldham) 3815/6 and 2412 Hop, London.

Telegrams:
"BRADDOCK, OLDHAM," and "METRIQUE, LAMB, LONDON."

WEIGHBRIDGES

FOR Motor Lorries and Railway Traffic can be seen erected at our Works READY FOR DELIVERY. Inspection by your Engineer invited and a test by your Local Inspector of Weights and Measures before delivery. Every machine a High-Class Engineering Product and fully guaranteed.

CHARLES ROSS, LIMITED,
SHEFFIELD.

OXIDE OF IRON.

SPENT OXIDE BOUGHT.

BALE & CHURCH, LTD.,
33, ST. MARY-AT-HILL, LONDON, E.C. 3.
Phone: Mansion House 1156.

"TORTO" FIRE CEMENT.

BALE & CHURCH, LTD.,
33, ST. MARY-AT-HILL, LONDON, E.C. 3.
Phone: Mansion House 1156.

"KLEENOFF," THE COOKER CLEANSER

Tins for Sale to Consumers.
In Bulk for Works Use.
(*See also p. 510, and the "Gas Salesman."*)

BALE & CHURCH, LTD.,
33, ST. MARY-AT-HILL, LONDON, E.C. 3.
Phone: Mansion House 1156.

STOCK FOR SALE BY TENDER.

By Order of the Directors.
LOWESTOFT WATER AND GAS COMPANY.

Messrs. A. & W. RICHARDS
are Instructed to OFFER FOR SALE BY TENDER

£35,000

FOUR PER CENT. PREFERENCE STOCK.
Minimum Price of Issue, Par.

Prospectus and Form of Tender (which latter must be sent in by 12 o'clock noon on Friday, 14th June) may be obtained of A. & W. RICHARDS, 37, WALBROOK, E.C. 4.

APPOINTMENTS, &c., VACANT.

THE GOSPORT AND DISTRICT GAS COMPANY.

APPLICANTS for the Position of COSTING CLERK are THANKED, and informed that THE VACANCY HAS NOW BEEN FILLED.

WANTED — Chief for Estimating Office, accustomed to General Constructional Engineering, particularly Gas, Oil, Coke Oven, and Blast Furnace Plants. Only men with real knowledge of and experience in this class of work need apply.

THE WHESSOE FOUNDRY AND ENGINEERING COMPANY, LTD, DARLINGTON.

PRODUCTION Superintendent required. Actual experience in Control of the Manufacture of Gas Cookers and Fires essential. State fully details of Experience in chronological order, Age, and Salary required. Applications treated in strictest confidence.

Apply, by letter only, to WORKS MANAGER, PARKINSON STOVE COMPANY, LTD., STECHFORD, BIRMINGHAM.

GLOUCESTER GAS LIGHT COMPANY.

APPLICATIONS are invited for the Appointment of a COSTINGS CLERK to the above Company. Commencing Salary, £156 per Annum. Candidates must have experience in Fitting Accounts and Costing of all Work executed by the Distribution Department. The successful candidate will be required to pass a Medical Examination.

Detailed applications, stating Experience, Age, and Qualifications, accompanied by *copies* of not more than Three recent Testimonials, to be sent to the undersigned not later than 15th June, 1935.

T. B. JAMES,
Secretary.

Gas Offices,
Eastgate Street,
Gloucester.

COMPANY NOTICES.

THE GAS LIGHT AND COKE COMPANY.

NOTICE is Hereby Given that the TRANSFER BOOKS of this Company, so far as they relate to DEBENTURE STOCKS, WILL BE CLOSED at 12.30 o'clock p.m. on Saturday, the 8th proximo, for the half-year ending on the 30th proximo, and will be RE-OPENED on the morning of Tuesday, the 11th proximo.

The Interest for the half-year will be remitted by Warrant forwarded by post on the 29th June next to the Proprietors registered on the Closing of the Books or their authorized Agents.

By order,
WILLIAM LYLE GALBRAITH,
Secretary.

Chief Office:
Horseferry Road,
Westminster, S.W. 1,
May 24, 1935.

CONTRACTS OPEN.

WARRINGTON CORPORATION.
(GAS DEPARTMENT.)

THE Committee invites Tenders for the following WORK:

DEMOLISH an Existing HOLDER.
REMOVE SCRAP.
Supply and Erect a SPIRALLY-GUIDED HOLDER, one million capacity, in the existing Brick Tank.
Supply and Install INLET and OUTLET MAINS, VALVES, SYPHONS, and PUMP.

Specification and Drawing may be obtained on application to the undersigned on payment of a sum of Two Guineas, which will be returned provided a *bona-fide* Tender shall have been received and not withdrawn

The Committee do not bind themselves to accept the lowest or any Tender.

Tenders, endorsed "Gasholder," to be addressed to the Chairman of the Gas Committee, Town Hall, Warrington, and to be received not later than the first post on 11th June, 1935.

A. COOK, M.Inst.Gas E.,
Engineer and Manager.

Gas Offices,
Mersey Street,
Warrington.

Continued on next page.

ROBERT DEMPSTER & SONS, LTD., ELLAND, Builders of CARBONIZING PLANTS, both Horizontal and Vertical. Manufacturers of CONDENSERS, PURIFIERS, GASHOLDERS, &c., also every description of COAL and COKE HANDLING PLANT. Telegrams: "DEMPSTER, ELLAND." Telephone: ELLAND 261 (Private Branch Exchange).

FIRTH BLAKELEY, SONS, & CO., LTD.,

Vulcan Ironworks, Church Fenton, Yorks.,

MANUFACTURERS of Gasholders, Tanks, Condensers, Purifiers, Scrubbers, Washers, and every description of Gas Plant.
Sole makers of the "P-M" Semi-water Gas Plant.
Telegrams: "BLAKELEYS, CHURCH FENTON." Telephone: BARKSTON ASH 34 (Private Branch Exchange). Code: "BENTLEYS."

CONTRACTS OPEN.—*Continued.*

THE GREAT YARMOUTH GAS COMPANY.

WASTE HEAT BOILER INSTALLATION.

THE Directors of the above Company invite TENDERS for the Supply, Delivery, and Erection of a WASTE HEAT BOILER and AUGMENTATION PLANT in connection with their Horizontal Retort Settings at their Works, Great Yarmouth.

Particulars of requirements may be obtained from the undersigned.

Tenders, endorsed "Waste Heat Plant," to be delivered here by first post on Friday, June 14th, 1935.

P. D. WALMSLEY,
Engineer.

40, King Street,
Great Yarmouth.

BOROUGH OF MANSFIELD.

TENDERS FOR SUPPLY OF NEW GAS METERS AND FOR REPAIRS TO GAS METERS.

THE Gas Committee of the Mansfield Corporation invite TENDERS for the Supply of NEW GAS METERS, also REPAIRS to GAS METERS, as from the 1st July next.

It will be a Condition of the Contract that the Standard Rate of Wages and Conditions of Labour prevailing in the District shall be observed.

Particulars may be obtained on application to Mr. James Gibson, Gas Engineer, Lime Tree Place, Mansfield, Notts.

Tenders, which must be enclosed in plain sealed envelopes, and endorsed "Tenders for New Gas Meters and Repairs to Gas Meters," to be delivered to the undersigned on or before Twelve noon on Tuesday, June 11th, 1935.

The Corporation do not bind themselves to accept the lowest or any Tender.

A. C. SHEPHERD,
Town Clerk.

Carr Bank,
Mansfield,
May, 1935.

DROITWICH CORPORATION.

(GAS DEPARTMENT.)

TENDERS are invited for the Re-SETTING of BED of 8 RETORTS. Specification may be obtained from the undersigned.

Tenders, in plain sealed envelopes, are to be endorsed "Tenders for Retort Setting," and delivered to the Town Clerk, Town Hall, Droitwich, not later than the 15th June, 1935.

C. C. SIDAWAY,
Engineer and Manager.

Gas-Works,
Droitwich,
May 25, 1935.

DROITWICH CORPORATION.

(GAS DEPARTMENT.)

TENDERS are invited by the Droit-wich Corporation for the Supply of 3,500 Tons of WELL SCREENED GAS COAL or COBBLES (South Yorkshire or North Wales Coalfields), delivered to the Droitwich G.W.R. Station during the period 1st July, 1935, to 30th June, 1936.

The Corporation reserve to themselves the right of allocating this Contract in such tonnage as they may decide upon.

Tenders, in plain sealed envelopes, endorsed "Coal Tenders," to the Town Clerk, Town Hall, Droitwich, not later than 12th June, 1935.

C. C. SIDAWAY,
Engineer and Manager.

Gas-Works,
Droitwich,
May 25, 1935.

BIRKENHEAD CORPORATION.

(GAS-WORKS.)

CONTRACT FOR STORES FOR THE GAS DEPARTMENT.

THE Corporation of Birkenhead are prepared to receive TENDERS for the Supply and Delivery of the following STORES and MATERIALS, as required at the Gas Department of the Corporation, for a period of Twelve Months commencing 1st August, 1935:

Form
No. 1.—WROUGHT IRON TUBES and FITTINGS.
,, 2.—CAST-IRON PIPES and SPECIALS.
,, 3.—BRASSWORK, GAS and METER FITTINGS.
,, 4.—TOOLS, BOLTS and NUTS, IRON and STEEL.
,, 5.—OILS, PAINTS, &c., BRUSHES, WASTE, HAMMER SHAFTS, and SUNDRIES.
,, 6.—TIMBER.
,, 7.—GAS METERS.
,, 8.—TINWARE, &c.

Particulars, with Conditions and Form of Tender, may be had, and Samples inspected, on application to the Gas Engineer, Gas Offices, Hind Street, Birkenhead.

Contractors are requested to read carefully the General Conditions embodied in the Form of Tender.

Tenders, which must be on the printed Form supplied, must be sent in to me in a plain sealed envelope, endorsed "Tender for Stores, &c., Gas Committee," not later than Five p.m. on Wednesday, the 12th June, 1935. Tenders not properly endorsed in accordance with instructions will not be considered.

The Corporation do not bind themselves to accept the lowest or any Tender, and reserve to themselves the right of accepting the whole or any portion of a Tender.

E. W. TAME,
Town Clerk.

Town Hall,
Birkenhead,
May, 1935.

CITY OF LINCOLN.

(GAS DEPARTMENT.)

TENDERS are invited for Cleaning and PAINTING the undermentioned:

No. 1 GASHOLDER—Two Lifts. Inner Lift, 101 ft. dia. by 30 ft. deep. Outer Lift, 103 ft. 6 in. by 30 ft. deep, with 12 C.I. Columns and two rows of Lattice Girders.
No. 2 GASHOLDER—Two Lifts. Inner Lift, 101 ft. dia. by 25 ft. deep. Outer Lift, 103 ft. 6 in. dia. by 25 ft. deep, with 12 C.I. Columns and one row of Lattice Girders.

Full particulars may be obtained from the undersigned.

Tenders, in plain sealed envelopes, endorsed "Painting of Gasholders," to be forwarded to G. H. Banwell, Town Clerk, Lincoln, not later than June 3rd.

The lowest or any Tender will not necessarily be accepted.

GEO. WRIGHT,
City Gas Engineer and Manager.

Lincoln,
May 23, 1935.

COUNTY BOROUGH OF WALSALL.

(GAS DEPARTMENT.)

MECHANISATION OF COKE HANDLING PLANT.

THE Gas Department is prepared to receive TENDERS for the above PLANT, which comprises:

Contract
No. 1.—Extension to Existing TELPHER TRACK.
No. 2.—FERRO CONCRETE BUNKERS, &c., complete with FOUNDATIONS.
No. 3.—ELEVATORS, CONVEYORS, SCREENING EQUIPMENT, ELECTRIC MOTORS, &c.

Forms of Tender, Specification, and Plans may be obtained from the undersigned. Applications to be made not later than Saturday, 8th June, 1935.

The scheme has been approved by the Walsall Town Council, but has yet to be subject to the Ministry of Health's sanction.

Applications to be made to the undersigned, when Plans, Specification, &c., will be forwarded on receipt of a sum of Five Guineas, which will be returned on the receipt of a *bona-fide* Tender.

The Corporation do not bind themselves to accept the lowest or any Tender.

FRED DAVIES,
Engineer and Manager.

Gas-Works,
Pleck,
Walsall,
May 27, 1935.

GASHOLDER REPAIRS.

ELECTRIC Welding or Plating Repairs to Inflated Gasholders.
Consult A. E. PLUMSTEAD & CO., LTD., 120, KING STREET, NORWICH.

PUBLICATIONS.

GAS ACCOUNT CALCULATORS.

SUPPLIED either by Price per Therm or Thousand, for any specified Calorific Value, in book form, office charts, or pocket charts for Meter Inspectors, printed in clear type. Write for particulars to F. H. WAKELIN, LTD., Calculator Specialists, 354, WHEELER STREET, BIRMINGHAM. 'Phone: Northern 0989. 'Grams: Reckoners, B'ham.

PATENTS.

MEWBURN, ELLIS, & CO.,
CHARTERED PATENT AGENTS AND
TRADE MARK AGENTS,
70 & 72, Chancery Lane, London, W.C. 2.
Telegrams: "Patent, London." 'Phone: 0437 Holborn.
And 3, St. Nicholas Buildings, Newcastle-on-Tyne.

KINGS PATENT AGENCY LTD. (Director B. T. KING, C.I.M.E., Patent Agent, G.B., U.S.A., and Canada), Advice, Handbook and Consultations free. 49 years' refs. 146A, QUEEN VICTORIA STREET, E.C.4. City 6161.

TROTTER HAINES, & CORBETT LIMITED
BRETTELL'S ESTATE
FIRE-CLAY & BRICK WORKS
STOURBRIDGE

Manufacturers of GAS RETORTS, GLASSHOUSE FURNACE & BLAST FURNACE BRICKS, LUMPS, TILES, and every Description of FIRE BRICKS.
Special Lumps, Tiles, and Bricks for Regenerative and Furnace Work.
SHIPMENTS PROMPTLY AND CAREFULLY EXECUTED.

LONDON OFFICE: E. C. BROWN & CO., LEADENHALL CHAMBERS, 4, ST. MARY AXE, E.C.

The "DEAN"
Boiler Tube Cleaner.

The totally different *Vibratory* Cleaner.
For all Water Tube and Fire Tube Boilers.
GREEN & BOULDING, LTD.,
162a, Dalston Lane, London, E.8.

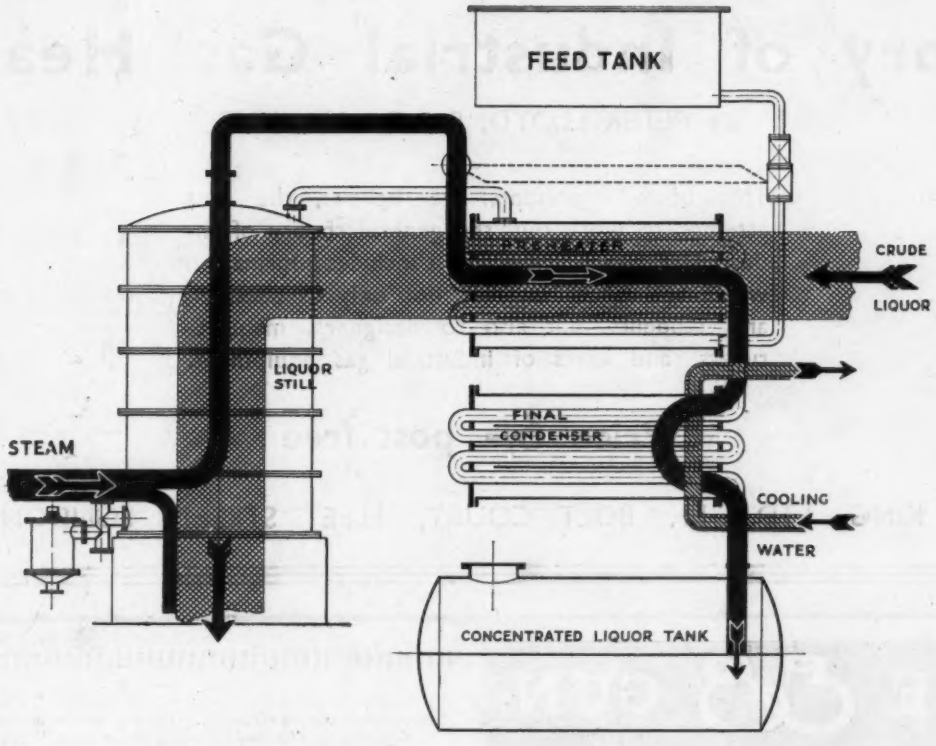
CAST IRON PIPES
FOR
GAS, WATER, & STEAM
1¼in. to 12in. BORE.

THOS. ALLAN & SONS, LTD.,
Bonlea Foundry,
THORNABY-ON-TEES.
Telegrams: "BONLEA, THORNABY-ON-TEES."
Telephone No.: STOCKTON 66121 (Two lines).

NEW DEVELOPMENTS IN

HOLMES

AMMONIA LIQUOR DISPOSAL



HOLMES AMMONIA CONCENTRATION PLANT

ENTIRELY AUTOMATIC IN OPERATION

A considerable amount of information is available to Gas Engineers on this subject, and also on

- **PURIFICATION OF AMMONIA STILL EFFLUENTS**
- **COMPLETE DISPOSAL AND UTILISATION OF LIQUOR WITHOUT EFFLUENT**

and their enquiries are invited. Special consideration is given to EACH ENQUIRY

W. C. HOLMES & CO. LIMITED

MEMBERS OF THE SOCIETY OF BRITISH GAS INDUSTRIES

HUDDERSFIELD AND LONDON

C 119

"G" BRAND
MALLEABLE TUBE FITTINGS

Accuracy of manufacture and Perfect Joints ensured by Testing under Air Pressure in Water.

Also Manufacture Tools for Gas Engineers, Stocks and Dies, Tube Cutters, Tube Wrenches, and Chain of every description.

JAS. J. GRIFFITHS,
CANAL WHARF WORKS,
NETHERTON, DUDLEY.

Gas Engineers are cordially invited to visit the showrooms of BRATT COLBRAN LTD. in Mortimer Street, W.1., where a wide range of "Portcullis" Gas Fires is displayed. In addition there is a unique collection of Antique Dog-grates and Marble Fireplaces.

Theory of Industrial Gas Heating

By PETER LLOYD, B.A.Cantab., A.I.C.

This book represents, we believe, the first attempt to work out the general theory of industrial gas application, and it includes information which will be of interest not only to salesmen and students, but also to designers, manufacturers, and users of industrial gas equipment.

Price 6/- post free

WALTER KING, LTD., 11, BOLT COURT, FLEET STREET, LONDON, E.C.4

THE E.B. GUN

Keep your Retorts bottle-tight, the "E.B. One-shot" way, and increase carbonising efficiency. The only satisfactory method of repairing Gas Retorts without cooling down. The Gun effectively seals leaks, and makes a permanent repair.

Full particulars and prices on request.
Ask about "E.B." special cements, too.

147, Corporation St.,
BIRMINGHAM.

E.B. REFRACTORY CEMENT Co LTD

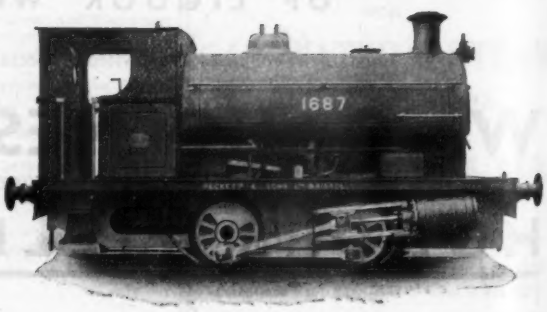
LOCOMOTIVES

LOCOMOTIVES of all Sizes and Gauges specially constructed for Main and Branch Lines, Contractors, Docks, Gas-Works, Collieries, Iron-Works, Brick and Cement Works, &c. Locomotives of various Sizes always in progress for early delivery.

Photographs, Specifications, and Prices on Application.

PECKETT & SONS, LTD., Atlas Locomotive Works, **BRISTOL.**

Telegraphic Address: "PECKETT BRISTOL."
London Representatives: FERGUSON & PALMER, 9, Victoria St., Westminster, S.W.1



INDEX TO "JOURNAL" ADVERTISERS

A

PAGE

Abbott & Co. (Newark), Ltd. ... ... —
Abbott, Birks, & Co. ... ... —
Alder & Mackay, Ltd. ... ... Cover I., 588
Allan, Thomas, & Sons, Ltd. 590
Anglo-American Oil Company, Ltd. ... —
Arden Hill & Co., Ltd. 483
Armco, Ltd. ... ... —
Ascot Gas Water Heaters, Ltd. Cover I., Centre VIII.
Ashmore, Benson, Pease, & Co., Ltd. Cover I.
Ashworth & Parker, Ltd.... 509
Askam, John F. 466
Automatic Light Controlling Co., Ltd. 497
Averill, C. R., Ltd. ... ... Centre II.

B

Bagnall, John, & Sons, Ltd. ... ... —
Baldwins, Ltd. 468
Bale & Church, Ltd. 510, 589
Balfour, Henry, & Co., Ltd. ... ... —
Bell's Asbestos & Engineering Supplies, Ltd. ... ... —
Blakeley, Firth, Sons, & Co., Ltd. ... 590
Braddock, J. & J. ... ... Centre XII., 589
Bratt Colbran, Ltd. 501, 592
Bray, George, & Co., Ltd. ... ... —
Bristol's Instrument Co., Ltd. ... ... —
British Aluminium Co., Ltd. 517
British Coal Testing Bureau ... ... —
British Fittings Co. (Hendon), Ltd. ... —
British Furnaces, Ltd. 494
British Gas Purifying Materials Co. ... 589
British Mannesmann Tube Co., Ltd. ... —
British Reinforced Concrete Engineering Co., Ltd. 467
British Thermostat Co., Ltd. ... ... —
British Thomson-Houston Co. Ltd. ... —
British Vacuum Cleaner & Engineering Co., Ltd. 490
Broadbent, J. C., & Co., Ltd. ... ... —
Broadbent, Thos., & Son, Ltd. 480
Bugden, T., & Co. ... ... —

C

Cambridge Instrument Co., Ltd. ... —
Cannon Iron Foundries, Ltd. ... Centre XIII.
Carron Company ... ... —
Cellactite & British Uralite, Ltd. ... —
Cement-Gun Co., Ltd. (The) 514
Chaseside Engineering Co. ... ... —
Chemical Engineering and Wilton's Patent Furnace Co., Ltd. 486
Clapham Bros., Ltd. ... ... —
Clayton, Son, & Co., Ltd. 493
Cliffdown Appliances, Ltd. ... ... —
Cochranes (Middlesbro') Foundry, Ltd. —
Concrete Utilities, Ltd. ... ... —
Cort, Robert, & Son, Ltd. Centre IV., 511
Cowan, W. & B. ... ... Cover III.
Crone & Taylor, Ltd. 490
Crookston, S., & Co. ... ... —
Crossley Brothers... ... ... —
Cutler, Samuel, & Sons, Ltd. ... Centre XI.

D

Davis Gas Stove Co., Ltd. ... ... —
Dempster, R. & J., Ltd. ... ... Cover I.
Dempster, R., & Sons, Ltd. ... Cover I., Centre X, 590
Denison, Saml., & Son, Ltd. 503
Diaphragm & General Leather Co., Ltd. 513
Donkin Co., Ltd. (The Bryan) Cover II., 478
Dougall's Gas Meters, Ltd. 496
Drayton Regulator and Instrument Co., Ltd. ... ... Centre IX.
Dry Gasholders, Ltd. ... ... —
Duckham, Alex., & Co., Ltd. ... ... —
Duxbury, Thomas, & Co. ... ... Cover I.

E

E. B. Refractory Cement Co., Ltd. ... 592
Eagle Range & Grate Co., Ltd. 477
Economic Gas Boiler Co., Ltd. 485
Electric Construction Co., Ltd. ... ... —
Electrolux, Ltd. ... ... —
Ellerstyle Engineering Co., Ltd. ... 508
Errington, T., & Sons 514
Evans, Joseph, & Sons (Wolverhampton), Ltd. 514
Ewart & Son, Ltd. 487
Expanded Metal Company, Ltd. ... —

F

F. C. Construction Co., Ltd. 493
Falk, Stadelmann, & Co., Ltd. ... ... —
Flavel, S., & Co., Ltd. ... ... —
Fletcher, Russell, & Co., Ltd ... ... —
Forth & Clyde & Sunnyside Iron Co., Ltd. —
Foster & Pullen, Ltd. ... ... —
Foster Bros., Ltd. ... ... —
Fraser & Chalmers Engineering Works... 502

G

PAGE

Gas Chambers and Coke Ovens, Ltd. ... 471
Gas Consolidation, Ltd. 514
Gas Meter Co., Ltd. ... ...Cover IV, 502
Gas Purification and Chemical Co. Cover I., 589
General Gas Appliances, Ltd. ... ... —
Gibbons Bros., Ltd. ... ... —
Gibbons (Dudley), Ltd. ... ... —
Glenboig Union Fireclay Co., Ltd. ... —
Glover, George, & Co., Ltd. 465
Glover, Thos., & Co., Ltd. ... 481, 518
Goodall, Clayton, & Co., Ltd. 489
Grant, David, & Co. 476
Graphite Products, Ltd. ... ... —
Green & Boulding, Ltd. 590
Griffiths Bros. & Co. (London), Ltd. Cover I.
Griffiths, Jas. J. 592

H

Hancock & Co. (Engineers), Ltd. ... —
Harris and Pearson, Ltd. 503
Hawkins, W. T., & Co. 509
Head, Wrightson, & Co., Ltd. ... ... —
Hilmor, Ltd. 509
Holmes, W. C., & Co., Ltd. ... Cover I., 591
Holophane, Ltd. ... ... —
Horseley Bridge and Thos. Piggott, Ltd. 499
Horstmann Gear Company, Ltd. ... —
Humphreys & Glasgow, Ltd. 516
Huntington Heberlein & Co., Ltd. ... —
Hurll, Peter & Mark, Ltd. ... ... —
Hurry Water Heater Co. ... ... —
Hyde, Silas... ... ... —

I

Imperial Chemical Industries, Ltd. ... —
Institute of Chemistry ... ... —

J

Jeavons, E. E., & Co., Ltd. ... ... —
Jenkins, W. J., & Co., Ltd. 512
Johnson, C. H., & Sons, Ltd. ... ... —

K

Keay, E. C. & J. (1926), Ltd. ... ... —
Keith, James, & Blackman Company, Ltd. 594
Kempton, C. H., & Co., Ltd. ... ... —
Kennicott Water Softener Co., Ltd. Cover IV.
Key Engineering Co., Ltd. ... Cover IV.
King, Walter, Ltd. 592
King's Patent Agency 590
Kirkham, Hulett, & Chandler, Ltd. ... —
Kleenoff Co. 510, 589

L

Laidlaw, R., & Son (Edin.), Ltd. ... 484
Lancashire Dynamo & Crypto, Ltd. ... —
Lead Wool Company, Ltd. ... ... —
Le Bas Tube Co., Ltd. 497
Lench, Thos. Wm., Ltd. ... ... —
Lind, Peter, & Co., Ltd. 507
Lomas, S. H., & Co. ... ... —
London Electric Firm, The ... ... —

M

Macpherson, Donald, & Co., Ltd. ... —
Main, R. & A., Ltd. ... ... Centre V.
Manchester Oxide Co., Ltd. ... ... —
McKelvie, James, & Co ... ... —
Meltham Silica Firebrick Co., Ltd. ... 474
Mewburn, Ellis, & Co. 590
Milne's Meters, Ltd. 480
Mitchell, H., & Co. ... ... —

N

National Benzole Co., Ltd. ... ... —
National Enamels, Ltd. 479
Neckar Water Softener Co., Ltd. ... —
New Conveyor Co., Ltd. ... ... —
Newton Chambers & Co., Ltd. ... ... Cover I., Centre VI.
Nobel Chemical Finishes, Ltd. ... ... —

O

Orme, George, & Co. ... ... —
Oughtibridge Silica Firebrick Co. ... 466
Oxley Engineering Co., Ltd. 491

P

Parkinson Stove Co., Ltd. ... Centre III.
Parkinson, W., & Co. 484, 488, 518
Pass, E., & Co. ... ... —
Pease & Partners, Ltd. ... ... —
Peckett & Sons, Ltd. 592
Peebles & Co., Ltd. 482
Pegson, Ltd. ... ... —
Perfecta Gas Thermostats, Ltd ... ... —
Pifco, Ltd. ... ... —
Plumstead, A. E., & Co., Ltd. ... ... —
Potterton, T. (Heating Engineers), Ltd. —
Powers-Samas Accounting Machines, Ltd. ... ... —

PAGE

Press, William, & Son 475
Pulsometer Engineering Co., Ltd. Cover IV.
Purimachos Ltd. 494

R

Radiation Ltd. 477, 483, 495
Rateau Engineers ... ... —
Reavell & Co., Ltd. 497
Richmonds Gas Stove Co., Ltd. ... ... —
Robinson, J. H., & Co. (L'pool), Ltd. ... 498
Ross, Chas., Ltd. 589
Rotherham & Sons, Ltd. ... ... —
Rotary Meter Company, Ltd. ... ... —
Ruscoe, John, & Co., Ltd. ... ... —

S

Sawer & Purves 585
Scientific and Projections, Ltd. ... ... —
Scottish Tube Co., Ltd. 486
Sheepbridge Coal and Iron Co., Ltd. ... —
Siebe, Gorman, & Co., Ltd. 494
Simmons & Hawker, Ltd. ... ... —
Simon-Carves, Ltd. ... ... —
Sisson, W., & Co., Ltd. ... ... —
Smith Meters, Ltd. ... ... —
South Metropolitan Gas Company Cover II.
Southerton, J., & Son, Martineau & Smith 499
Spencer, W., & Sons 490
Spencer-Bonecourt, Ltd. ... ... Centre VII
Sperryn & Co. ... ... —
Stanton Ironworks Co., Ltd. 583
Staveley Coal and Iron Co., Ltd. ... —
Steel Band Conveyor and Engineering Co., Ltd. ... ... —
Stein, J. G., & Co., Ltd. ... ... Cover I.
Stewarts and Lloyds, Ltd. 500
Stoves, Ltd.... 505
Strachan & Henshaw, Ltd. 465
Stringer Bros. ... ... —
Sugden, F. C., & Co., Ltd. ... ... —
Sugg, Wm., & Co., Ltd. 469
Sutherland, A. G., Ltd. ... ... —
Sutherland Meter Co., Ltd. ... ... —

T

Taylor, Chas. (Birmingham), Ltd. ... —
Thermal Appliances, Ltd. ... ... —
Thomas & Bishop, Ltd. 587
Thompson, J. (Wolverhampton), Ltd. ... 476
Tilley Bros., Ltd. ... ... —
Torbay Paint Company ... ... Cover I.
Trier Bros., Ltd. ... ... —
Trotter, Haines, & Corbett, Ltd. ... 590
Tully Sons & Co., Ltd. 494
Turners Asbestos Cement Co. 503

V

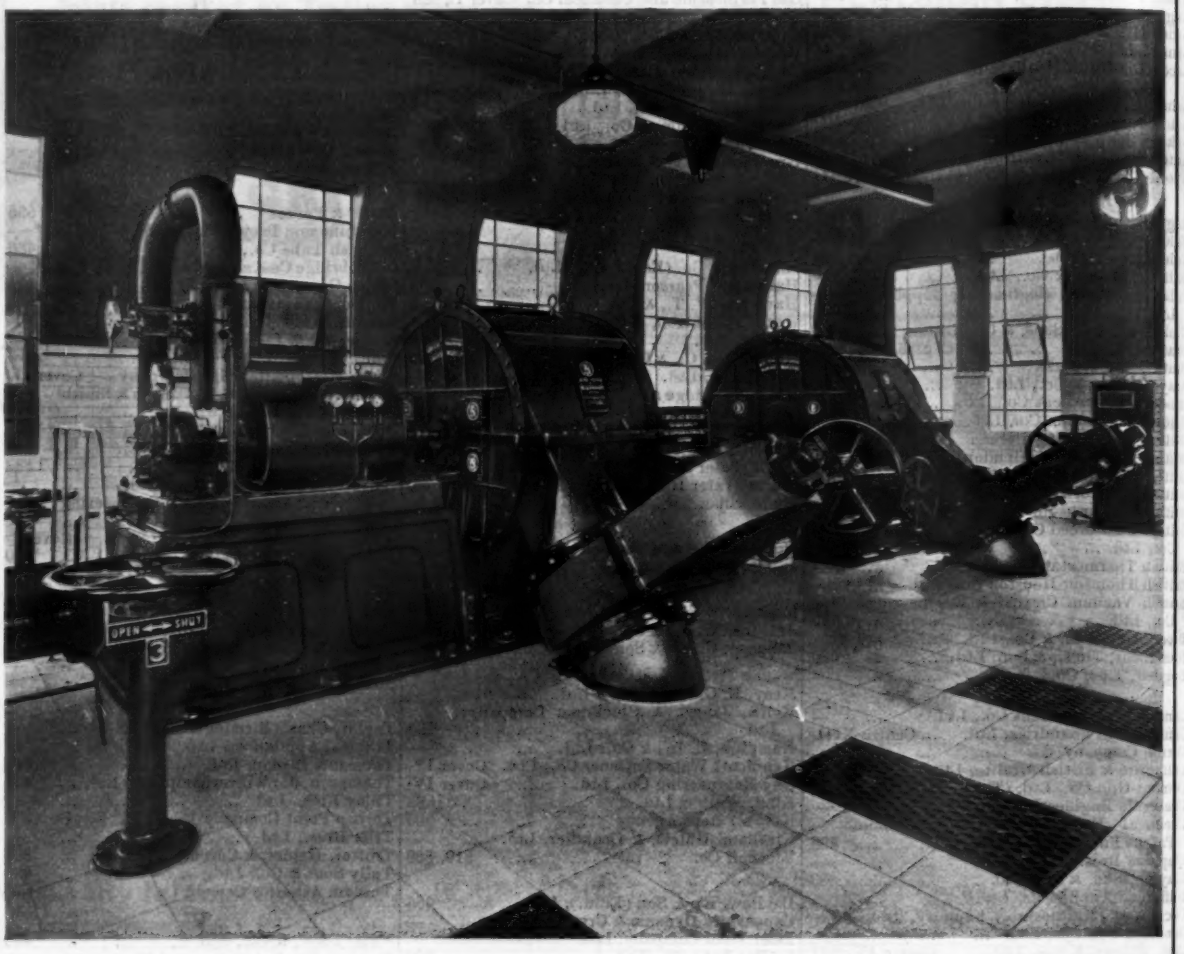
Vale, Thos., & Co., Ltd. 470
Vertical Gas Retort Synd., Ltd. ... —
Vickers-Armstrongs, Ltd. ... ... —
Visco Engineering Company, Ltd. ... —
Vulcan Stove Co., Ltd. ... ... —

W

Wailes, George, & Co. Ltd. ... ... —
Wakelin, F. H., Ltd. 590
Walker, C. & W., Ltd. 584
Walker, Crosweller, & Co., Ltd.... ... —
Waller, Geo., & Son, Ltd. 515
Waterless Gasholder Co., Ltd. ... ... —
Weir, G. & J., Ltd. ... ... —
Wellington Tube Works, Ltd. ... ... —
West's Gas Improvement Co. ... Centre XIV.
Westwood & Wrights, Ltd. 504
Whessoe Foundry and Eng. Co., Ltd. 472, 473
Wholesale Fittings Co., Ltd. ... ... —
Wilkinson, William ... ... —
Willey & Co., Ltd. 492
Williamson Cliff, Ltd. ... ... —
Wilson (George) Gas Meters, Ltd. ... 506
Wilsons & Mathiesons, Ltd. 495
Windsor, H., & Co., Ltd. ... ... —
Winn & Coales, Ltd. 496
Withinshaw, A. ... ... —
Woodall-Duckham Co., Ltd. ... Centre I.
Worthington-Simpson, Ltd. ... ... —
Wright, Alex., & Co., Ltd. ... Cover I.
Wright, John, & Co., Ltd. ... ... —

Agencies, &c. ... ... —
Appointments Vacant & Wanted ... 589
Company Notices 589
Contracts Open 589, 590
Educational... ... ... —
Financial 589
Gasholder Repairs... 590
Patents 590
Plant, &c., Wanted and for Sale... ... —
Publications 590
Tarpaulins ... ... —

TWO LARGE KEITH-BLACKMAN TURBO GAS BOOSTERS IN THE WORKS OF THE COUNTY BORO' OF BLACKPOOL GAS DEPARTMENT . . . . . .



. . . . . each machine is a two-stage "K-B" Turbo Gas Booster, the one on the left being driven by turbine and the other by electric motor.

Each of these Turbo Boosters is designed to deal with 750,000 c.f.p.h. town's gas at a pressure increase of 35 ins. water gauge.

Keith-Blackman Gas Boosters are installed in numerous Gas Works in this country and abroad. They are made in various types and sizes for dealing with from 5,000 up to 1,000,000 c.f.p.h.

Send us particulars of your boosting requirements, large or small, and we will advise you on the most suitable solution.

James KEITH & BLACKMAN Co. Ltd.
HEAD OFFICE:
27, FARRINGDON AVENUE, LONDON, E.C.4.
'PHONES: CENTRAL 7091. 'GRAMS: JAMES KEITH, PHONE, LONDON.

If you would prefer to discuss your problem on site with a representative from our nearest branch office, we will gladly arrange a mutually convenient day and time.

Printed (at the Chancery Lane Printing Works, Ltd.), for Walter King, Limited, 11, Bolt Court, Fleet Street, London, E.C. 4.—Wednesday, May 29, 1935.